SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[*The* MINING JOURNAL *is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.*]

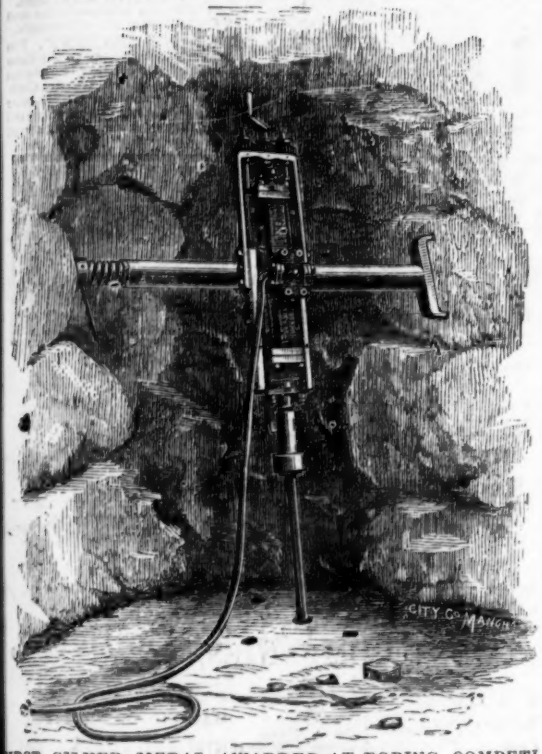
No. 2570.—VOL. LIV. LONDON, SATURDAY, NOVEMBER 22, 1884. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC —Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air.

JUBILEE EXHIBITION, 1882.

THE PATENT

"CORNISH" ROCK DRILL.



FIRST SILVER MEDAL AWARDED AT BORING COMPETITION, DOLCOATH MINE, 1881.

The "CORNISH" ROCK DRILL and "CORNISH" COMPRESSOR

are now largely in use, and in every case are giving entire satisfaction.

For Testimonials, Illustrated Catalogues and prices, apply to—

HOLMAN BROTHERS,

CAMBORNE FOUNDRY,

MAKERS OF

MITCHELL & TREGONING'S PATENT PULVERISER, and HOLMAN'S IMPROVED STEAM or AIR PUMPING and WINDING ENGINE for Underground Quarries or Shallow Mining. Indispensable for Shaft Sinking with Rock Drills. Also makers of all kinds of MINING MACHINERY at

THE CAMBORNE FOUNDRY AND ENGINE WORKS, CAMBORNE, CORNWALL.

THE PATENT

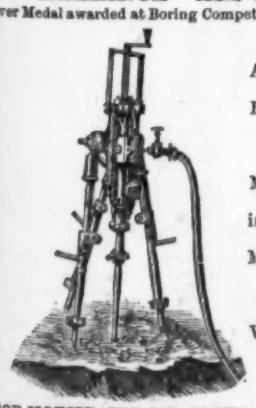
"ECLIPSE" ROCK-DRILL

AND

"RELIANCE AIR-COMPRESSOR."

First Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.

SILVER MEDAL—PARIS, 1878—HIGHEST AWARD



Are NOW SUPPLIED to the ENGLISH, FOREIGN, and COLONIAL GOVERNMENTS, and are also IN USE in a number of the largest MINES, RAILWAYS, QUARRIES, and HARBOUR WORKS in GREAT BRITAIN and ABROAD.

FOR ILLUSTRATED CATALOGUE AND PRICES, apply to—

HATHORN & CO., 22, Charing Cross, London, S.W.

MORDEY, CARNEY, AND CO. (LIMITED),

SHIPBUILDERS, AND MARINE AND GENERAL ENGINEERING WORKS,

DRY DOCKS, NEWPORT, MON.

All kinds of WROUGHT and CAST IRON STRUCTURAL WORK, Landing Girders, Tanks, Boilers, Colliery Plant, Winding Engines, Coal Wagons, heavy Smith Forgings, Dock Gates and Caisons, requirements of Harbour and Dock Works, &c., &c.

All Orders executed promptly, and Tenders from Plans and Specifications.

PATENT

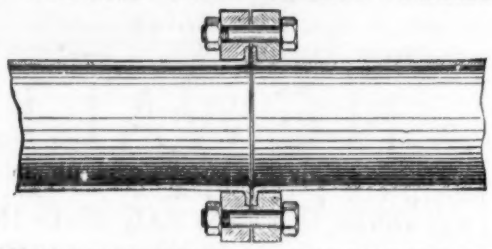
"INGERSOLL ROCK DRILL."

MEDAL AND HIGHEST AWARDS.

1872—American Institute.
1873—Ditto.
1874 — London International.
1875—Manchester.
1875—Leeds.
1875—Cornwall.
1875—Rio de Janeiro.
1876—Australia.
1876—Philadelphia.
1877—Cornwall.
1877—Mining Institute.
1878—Paris.

We claim 40 per cent. greater effective drilling power.

WROUGHT-IRON STEAM TUBES.



TUBES FOR BOILERS, PERKINS'S, and other HOT-WATER SYSTEMS.

For Catalogues of Rock Drills, Air Compressors, Steel or Iron Steam Tubes, Boiler Tubes, Perkins's Tubes, Pneumatic Tubes, Boring Tubes, and all kinds of Machinery and Mining Plant, apply to—

LE GROS, MAYNE, LEAVER & CO.

60, Queen Victoria Street, London, E.C.

The New System for Working Gold, Stream Tin, and Diamond Alluvials.

THE "BALL PATENT."

9, BUSH LANE, CANNON STREET, LONDON, E.C.

This new system renders River and Placer Marsh Swamps and Plateau Mining the cheapest of all. No head of water required as per Californian Hydraulic System. Only a few tons of water wanted a day.

ABSOLUTELY CLEARS THE LAST PARTICLE ON BED ROCK OR CLAY BOTTOM.

No fall required for dumping tailings. Depths of rivers, floods, and other difficulties entirely surmounted. 600 tons a day raised, dispersed, washed, and dumped per day for 3d. a ton by smallest plant, 1200 tons by second size plant at 2d. per ton.

See *Mining Journal*, 19th January and 16th February, 1884, on THE CHEAPEST METHOD OF TREATING AURIFEROUS ALLUVIALS.

NOTICE—TO MINING INVESTORS.

In such esteem is the system held that several extraordinary participations in Gold Alluvials are offered simply for the trouble of putting plant on certain concessions and working it.

Syndicate A completed.
Syndicate B completed.
WANTED, investors in C Syndicate.

Profits are very large, but it is deemed advisable not to publish them, and they will be only communicated to *bona fide* enquirers.

SUBSCRIPTION NOW OPEN FOR SYNDICATE C.

Apply by letter first, or personally to above address, Mondays and Tuesdays, 11 to 2 P.M.

J. S. MERRY,

ASSAYER AND ANALYTICAL CHEMIST,

SWANSEA,

SUPPLIES ASSAY OFFICE REQUIREMENTS AND RE-AGENTS.

AIR COMPRESSORS,

With R. SCHRAM'S Patent

Inlet and Outlet Valves.

BOILERS, TURBINES.

SCHRAM'S IMPROVED

ROCK DRILL.

1600 in Use in all Parts of the World.

Complete Rock Boring Plants of the most approved construction for Railway Tunnels, Quarries, Shaft Sinking, Level Driving, Stoping, and Submarine Blasting.

All Kinds of Mining Machinery.

ESTIMATES AND FULL PARTICULARS ON APPLICATION.

RICHARD SCHRAM & CO.,

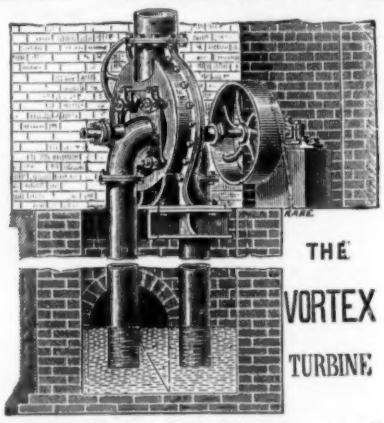
9, NORTHUMBERLAND STREET, CHARING CROSS, LONDON.

GILBERT GILKES & CO.,

KENDAL, ENGLAND,

LATE

WILLIAMSON BROS.



THE VORTEX TURBINE

A most efficient means of applying Water Power to all kinds of Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING, WORKING ORE-CRUSHING MACHINERY, and for other purposes in connection with MINING.

Successfully used in ELECTRIC LIGHTING, and in utilising DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with several Illustrations and a number of Testimonials, can be obtained on application.

New Patent Simplex Hammer Motion Stone and Ore Breaker.

S. MASON and Co.,

STONE MACHINE WORKS, LEICESTER,

Has been awarded the last MEDAL for their SIMPLEX STONE BREAKER. It only has five wearing parts; others have 26.

LARGE SIZES.

Can be worked by hand.

Catalogue free on application.

N.B.—A Machine can be seen working at the Metropolitan Board of Works.

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING for High-Pressure Engines

The following testimonials refer to this Packing:—

Mona Lodge, Amlwich, Anglesey,
2nd August, 1884.

DEAR SIR,—I have much pleasure in answering your note. Bad times in mining have compelled me to try all kinds of expedients in order to effect saving; some have succeeded and some have failed, but my underground manager, Capt. Hughes, has just said to me by the telephone—"The Asbestos Packing is the best thing ever brought here."

It saves money and trouble, but like my gas purifying oxide it lasts so long that you must not expect another order from me for twelve months at least.

Yours truly, T. F. EVANS,
Late H.M. Inspector of Metalliferous Mines.

Mr. J. Bell.

Manchester, Sheffield, and Lincolnshire Railway—Steamship Department,
Grimsby, April 10th, 1884.

DEAR SIR,—I have much pleasure in stating that after a trial of over nine months, and comparing it with other packings, I can confidently recommend your Asbestos Packing. It is especially valuable when high-pressures are employed, as in cases where other packings have perished, owing to high temperatures, your packing has invariably stood well. I have also used it with complete success when a gland has heated with other packings, and also in cases of badly scored piston rods. I consider the results I have obtained by its use for our marine engines to have been in every way highly satisfactory. Yours truly,

G. H. CLARKE, Sup. Engineer.

Mr. J. Bell.

Department of the Director of Navy Contracts,
Admiralty, Whitehall, 20th June, 1884.

SIR,—I have to inform you that your tender has been accepted for Bell's Rolled Cloth Asbestos Packing to sample submitted:—Elastic core ... ... Square.
" " ... ... Round.

JOHN COLLETT, Director of Navy Contracts.

To Mr. John Bell.

The Patent Block Packing is square, as Fig. 1 and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears the trade mark.

BELL'S ASBESTOS BOILER PRESERVATIVE.—This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; 1/8 in., 60 per cent.; 1/4 in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundred-fold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING for Locomotives and all Stationary Engines running at very high speed with intense friction. Sandwell Park Colliery, Smethwick, 1st February, 1884.

To Bell's Asbestos Works.

DEAR SIRS,—I have much pleasure in stating that I have used your Asbestos Packing for the last 13 months for our large winding engines which are running night and day, and also for the fan, pumping, and hauling engines at the above Colliery, and during that period we have not used more than one-third the Packing we had formerly; and this I attribute to your Packing on account of its great durability and general excellence of quality.—I am, dear Sirs, yours faithfully,

THOMAS WINTER, Colliery Engineer.

BELL'S ASBESTOS.

The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All "home" orders should be sent direct to the undermentioned depôts and not through Agents or Factors.

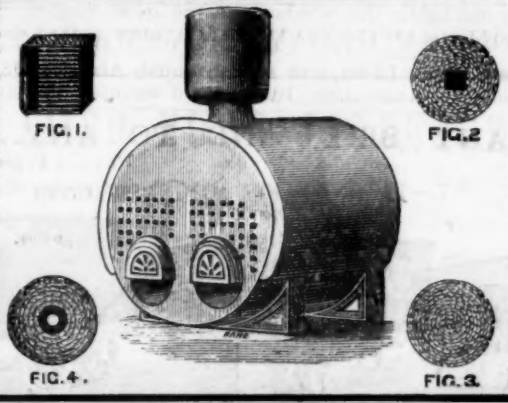


FIG. 1.

FIG. 2

FIG. 4.

FIG. 3.

BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
" " Covering - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening 20 lbs. of steam were found in the boiler next morning.

The following Testimonials refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon, Nov. 28th, 1883.

DEAR SIR,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering. Yours truly, W. SANTO CRIMP, C.E., F.G.S.

The Tamar and Kit Hill Granite Company (Limited),
Gunnislake, Tavistock, 8th April, 1884.

Mr. John Bell, Southwark, S.E.

SIR,—I have much pleasure in stating that the Asbestos covering applied by you to the boiler of our travelling crane at Kit Hill has yielded most remarkable results. Since it has been in use we have saved fully half our coals, and have effected a great saving in the time it takes to get up steam, which is often a matter of great importance to us. I should add that the crane runs on high gantries, and is fully exposed to all weather. I have formed the highest opinion of your Asbestos as used for this purpose, and as you are aware, have had another boiler similarly covered, though it has not since been used. I can most strongly recommend the material.

I am, Sir, yours faithfully, W. J. CHALK, Assoc. M. Inst. C.E., Engineer and Manager.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors. It is kept in stock in rolls of 100 ft., from 1/8 in. to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and 1/2 millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

The following copy of acceptance of tender refers to above:—

Department of the Director of Navy Contracts,
Admiralty, Whitehall, S.W., 17th May, 1884.

SIR,—I have to inform you that your tender for Asbestos Millboard has been accepted.—Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT). This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials. The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth thus producing an excellent joint where expansion and contraction render other materials unserviceable. This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.

BELL'S "ASBESTOS LUBRICANT." "REG[D]"

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.

OR THE DEPOTS—118a, SOUTHWARK STREET, S.E.,

Victoria Buildings, Deansgate, MANCHESTER. 11 and 13, St. Vincent Place, GLASGOW. 39, Mount Stuart Square, CARDIFF. 21, Ritter Strasse, BERLIN.

R. S. NEWALL AND CO.,

Sole Patentees of Untwisted Wire Rope.

Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

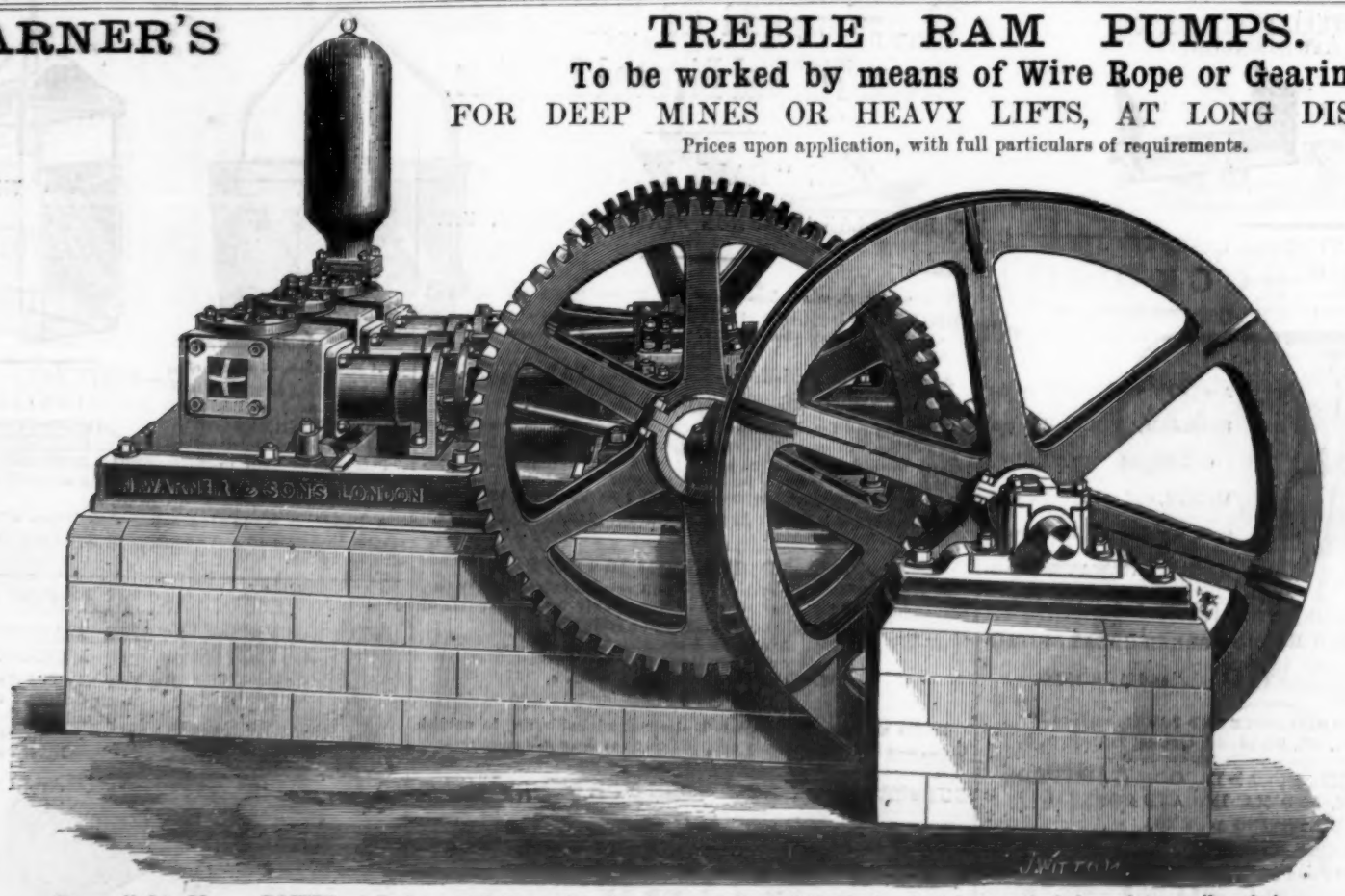
London: 130, STRAND, W.C. Liverpool: 7, NEW QUAY.
Glasgow: 68, ANDERSTON QUAY.
MANUFACTORY: GATESHEAD-ON-TYNE.

WARNER'S TREBLE RAM PUMPS.

To be worked by means of Wire Rope or Gearing.

FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.

Prices upon application, with full particulars of requirements.



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

JOHN WARNER AND SONS, THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.

R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.
In connection with the Leeds Exchange, and all the principal Hotels and places of business in the town.

GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London, via Laisterdyke and Ardsley Junctions.)

Registered Telegraphic Address:—"GILDERSOME, LEEDS."
A. B. C. Code used.

UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

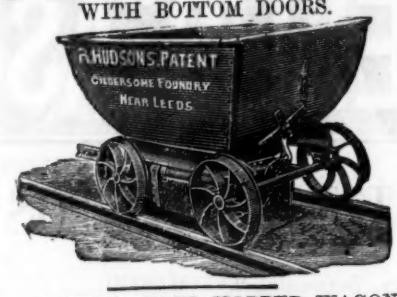
Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

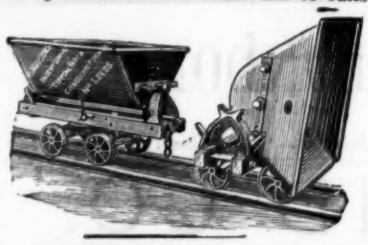
1.—PATENT STEEL END TIP WAGONS.

7.—PATENT STEEL MINING WAGONS.

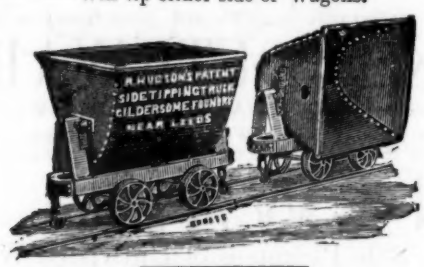
12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.



2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.

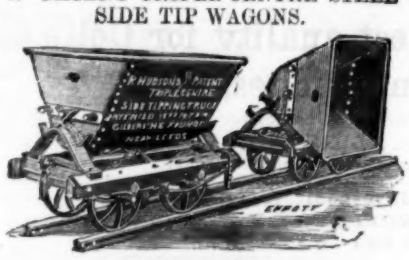


8.—PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.

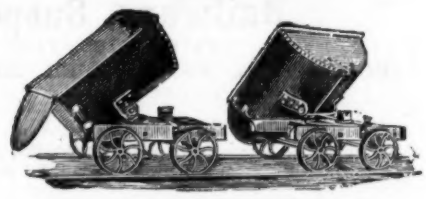


13.—PATENT STEEL HOPPER WAGON.

3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.

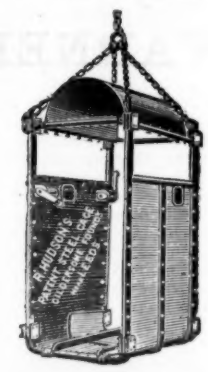


9.—PATENT STEEL ALL-ROUND TIP WAGON.



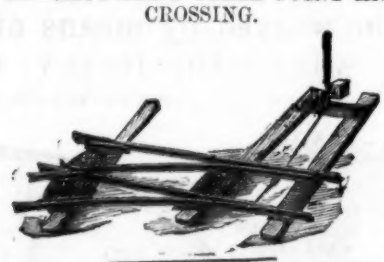
14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF-ACTING if desired.)

15.—STEEL CAGE.



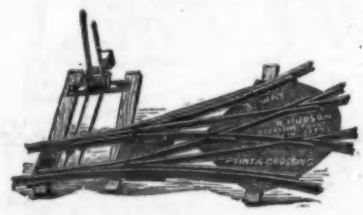
4.—PATENT STEEL PLATFORM OR SUGAR CANE WAGON.

10.—LEFT-HAND STEEL POINT AND CROSSING.



5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt).
DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity UPWARDS to any desired size.)

11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.

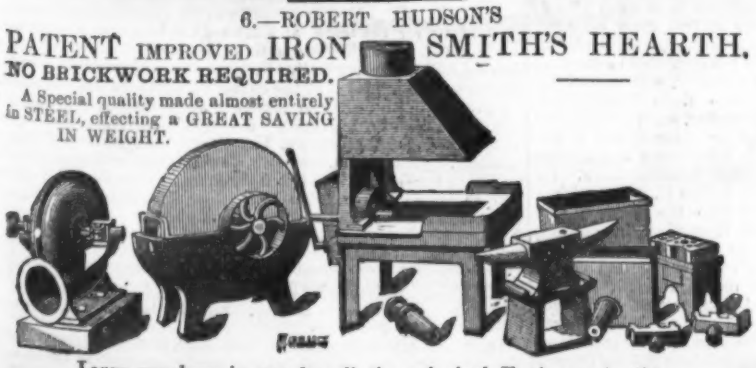
A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.

(Also made in CAST Iron for use where weight is not a consideration.

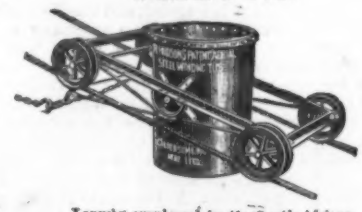
No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrows

6.—ROBERT HUDSON'S
PATENT IMPROVED IRON SMITH'S HEARTH.
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.



Large numbers in use by all the principal Engineers in this country and abroad.

18.—"AERIAL" STEEL WINDING TUB.



Largely employed in the South African Diamond Fields.

ONE man can EASILY tip ANY WEIGHT in these wagons.

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

Pumping Engines for Mines, Water Works, Sewage Works, and General Purposes.

CATALOGUES ON

PUMPING & MINING MACHINERY.

HATHORN, DAVEY, & CO., LEEDS.

Hydraulic Pumps, Winding Engines, Air Compressors, Man Engines, Capstans, &c., &c.

APPLICATION.

THE "ADELAIDE" ROCK DRILL.

THE BEST IN THE MARKET.

ADVANTAGES.

Great Simplicity and Durability. Great Strength and Portability.
Great Economy in Consumption of Air. High Rate of Drilling.

REASONS.

It has no Valves or Tappets. ONLY ONE MOVING PART.
It works expansively, & is almost entirely constructed of Steel.

PROOFS.

TESTIMONIALS. See Circular, sent free on application.
A FREE TRIAL at any Mine or Quarry in Great Britain.

SOLE MANUFACTURERS.

T. B. JORDAN, SON, & COMMANS,

OFFICES:—ADELAIDE CHAMBERS, 52, Gracechurch St., London, E.C.

THE AMERICAN TINNED PLATE TRADE.

An important statement showing the results of a "tariff for revenue" without protection, has been issued by the American Tinned-Plate Association. It is remarked that "During the fiscal year ended June 30 the United States Customs Records show the importations of British tin-plates, terne-plates, and taggers tin, have amounted to 507,894,756 lbs., valued at $18,182,637 at Liverpool. This amount, added to the freights paid thereon to British steamship lines, and insurances paid to British insurance companies, has caused an outflow of more than $20,000,000 gold from the United States to Great Britain during the past year. American consumers pay prices indicating a yearly expenditure of about $30,000,000 for these British tinned and leaded forms of sheet-iron and steel: $30,000,000 represents the labour of not less than 75,000 people in the United States for a year. This branch of iron and steel production has been totally suppressed and prohibited in the United States by unprotective revenue only rates of duty varying from 15 per cent. *ad valorem* to 1 1-10th per lb.—at present 1 cent per lb. The business has been controlled by a few large importing firms and British agents, composing the tin-plate monopoly in the United States.

Unprotected by home competition, American householders have been notoriously swindled by miserable materials, inadequate coating, and false branding. Influenced by popular indignation, and a well-grounded apprehension that this association is certain to secure from Congress fair play to American manufacturers, and relief to American consumers from foreign tin-plate impositions, by the enactment of protective duties on tin-plates and taggers iron, these British manufacturers and their American stool pigeons, the importers, have advertised a so-called reform, the principal features of which so far have been a confession of past sinful practices on the one hand, while using the reform as a lever with which to obtain larger profits from American consumers; on the other hand, by extra prices for special brands and crosses. It is a heathen Chinee business wherein the crosses crown the innocent philanthropic importer. The American people can have no permanent relief nor security from future impositions, except through a development of American manufacturing competition by protective duties.

The dishonest and treasonable character of so-called revenue reformers in and out of Congress, is exhibited in their unanimous refusal to accord fair play to this important industry, and thus aid to upheld the material wealth and prosperity of the American people. If made in the United States they would be produced by and paid for in the labour of our own people, while $20,000,000 would be saved from going to Europe annually, and added to the permanent wealth of the nation every year. A better idea of the magnitude of this industry, and how it would stimulate railroad transportation and other interests, is exhibited by the following statement showing what would be necessary to produce them annually in the United States, approximate:—850,000 tons iron ore, 300,000 tons limestone, 1,500,000 tons coal, 300,000 tons pig-iron, 5,000,000 bushels charcoal, 5,000,000 lbs. lead, 25,000,000 lbs. tin, 10,000,000 ℔s. tallow, 10,000,000 ft. lumber, 30,000,000 lbs. sulphuric acid, $12,000,000 labour in tin-plate works alone.

The interest on $30,000,000 capital to be invested in the construction of mills and machinery; $1,000,000 annually for repairs; $100,000 annually for oils and lubricants; $1,000,000 annually for insurance and taxes. The necessaries of life for 300,000 people supported by the industry. National wealth can only be created by labour in production and in utilising our own raw materials with which God has blessed our land. American tin and terne plates are wanted, and must be had. A protective tariff is essential, and will benefit the American consumer and manufacturer mutually." This precious document is signed by "The American Tinned Plate Association."

ROCK-DRILLING WITH WATER PRESSURE.—When the French engineers first began the Mont Cenis Tunnel, says a Paris correspondent of the Boston Herald, the work was done in the old-fashioned way by means of hand-drills and blasting. Later, machines were invented driven by compressed air, which did away with the hand-drills, and by the aid of which the work was successfully completed. Similar but improved machines were employed in the piercing of the St. Gothard; but when Mr. Brandt undertook the piercing of the Alberg he proposed to the contractors to substitute water pressure for compressed air. He invented a special apparatus for the purpose, and the experiments made with it in the Westphalian mines were so satisfactory that his proposition was adopted on the western side, while the piercing of the eastern gallery was to be done by the same means as had been employed on the Gothard Tunnel, known as the Ferroux machine. After a few months' experience it was demonstrated that the Brandt was in perforating power the equal, if not the superior, of the Ferroux machines, while it possessed an undoubted superiority for the ventilation of the gallery, and consequently for the health and comfort of the workmen. When I saw the Brandt machine at work I was struck by the contrast between its smallness and the greatness of the task it had to accomplish. In appearance and size it resembles an old-fashioned 6 lb. field piece. The drill has a diameter of 30 in., and consists of a circular auger, which is held powerfully against the rock by means of a hydraulic pressure of from 100 to 120 atmospheres, while at the same time a rotary movement is imparted to it. The pressure against the face of the rock is the result of a water pressure column contained in the cannon-like cylinder of the machine. Inside of this cylinder is a fixed piston-rod, a detail in which the Brandt machine differs from all other similar drills, in which it is the cylinder that is fixed, and the piston-rod that is movable. The rotary movement is imparted to the drill by means of a cog-wheel acting on the cylinder, and moved by a transversal endless screw, driven by two little hydrometric engines placed on either side. The drill makes, according to the nature of the rock, from 5 to 12 revolutions per minute, and it can be driven to a depth of 39 in. When it is withdrawn a dynamite cartridge is inserted, and the face of the gallery is blown down. By means of four of these machines a gallery 16,300 ft. long, with a heading of 10 square yards, was driven into the western side of the Arlberg during the same space of time that six Ferroux machines were driving a similar gallery 17,900 ft. into the eastern side of the mountain. The daily rate of progress varied greatly, according to the nature of the rock traversed. Sometimes a stratum of exceptionally hard rock would be encountered, and sometimes the strata would be so friable that the roof and sides of the gallery had to be immediately protected with shoring. At the start the average daily progress did not exceed 6½ ft., but toward the end 26 ft. was the minimum and 37 ft. the maximum of a day's work. As high as 100 cubic yards of rock were sometimes removed during 24 hours, and an average of 500 cubic yards of masonry were built per day. About 2,000,000 lbs. of dynamite were used in this blast, and most of it was manufactured on the spot, in large frame buildings erected for the purpose in isolated spots at either end of the tunnel.

SCIENCE.—At a meeting of the Literary Section of the Union of Teachers and Students, at the Birmingham and Midland Institute on Nov. 14 (the Rev. A. J. Smith in the chair), papers were read suggesting courses of study in literature, in science, and in literature and science. Taking "Science" as his subject Mr. SNELL began by saying that science was nothing more than organised common sense, which was the agent to whose workings the growth of civilisation was solely attributable. Every branch of science had a distinct bearing on the industries, and, therefore, he presumed, on the happiness of mankind. It was manifestly impossible to fix upon a course of study which would be exactly suitable to all classes of individuals, but it might be possible to mark out a course for an ideal student—a student desirous of obtaining a general knowledge of the whole range of science; and this course would be applicable, in part, to all who took up science. First of all, those branches of science which were common to all science should be taken, and those were an elementary knowledge of logic and mathematics. After mathematics came physics and chemistry. Then most students would be prepared to take up their own special subjects for their own special branches of industry, but those with the inclination and the time should next study physiology, both animal and vegetable, wherein problems would be met with of an infinitely more complicated character than in the chemical and physical laboratories. It might, perhaps, at this point be advisable to obtain a little knowledge of the subsidiary sciences—those of classification—botany, zoology, and geology; but great care was necessary in order to avoid falling into the error of spending too much time on these subjects, unless the student wished to make a special study of one of them. Next to these in the order of complexity was the science of psychology, the study of the mind; and then came the science of sociology, a still more complicated subject. The study of the governing laws of society then introduced the student to the region of political economy. The one pervading stimulus of the real investigator of Nature was a love for the truth, and his search was a search after facts, upon which he might be able to build his philosophy of life, and, having built it, to try to live in accordance therewith.—Mr. Munro expressed his approval of the course of study in science laid down by Mr. Snell, and advised students after taking up chemistry and physics to read Prof. Geikie's "Geology." Students of science need not read ancient literature, but should rather study French and German. There were, however, few original works in French on scientific subjects. He advised students to keep the study of literature as separate as possible from that of science. An interesting discussion followed the reading of the papers.

COPPER, TIN, AND LEAD.—Messrs. FRY, JAMES, and Co. (Nov. 13) write:—Copper has been sluggish in demand for the most part during the last fortnight, but without any material change in prices. The general position remains unchanged. Tin is dearer by nearly 2*l.* per ton since our last, and the tone of the market has been steadier. Lead continues in moderate demand, without change in quotations.

IRON AND MANGANIFEROUS ORES.—Mr. E. S. FERGUSSON (Cardiff, Nov. 19) writes—The past week has been another quiet one in the ore market. Sellers of Rubio are holding off for 11s. 6d. per ton c.i.f.; but buyers, except in isolated cases, will not pay more than 11s. F.o.b. prices are 6s. for Rubio and 6s. 4d. for Campanile. Freights from Bilbao to Cardiff or Newport are 5s. 6d. Pig-iron is unchanged. Blaina B.B.F. is quoted 40s. at works, and No. 4 forge Middlesborough realises 40s. per ton c.i.f.

Original Correspondence.

THE SILVER-BEARING LODES OF THE BARRIER RANGES.—No. II.

SIR,—One mile south-south-east from the Apollyon is the Bobby Burns lode, which has been prospected to a depth of about 40 ft., where it almost thins out, but with lenticular veins of ferruginous quartz in the schist under the hanging-wall, while at the surface it is about 3 ft. thick; but as it is characterised like the Umberumberka and Apollyon lodes by a well-defined hanging-wall, the lode will doubtless make again and continue, though varying in thickness, to a considerable depth. It dips east at an angle of 60°, and consists of lenticular masses of gossan and galena up to 9 in. thick, in crumpled mica schist, with veins of ferruginous quartz. The bounding rock is talcose mica schist, with quartz reefs and granite dykes. About 5 chains to the east is a large mass of granite extending in a northerly and southerly direction, so that the lodes run almost parallel with it. Immediately to the north, in portions 1, 3, 10, 17, 25, similar promising gossan lodes, up to 4 ft. thick, with argentiferous galena, carbonate of lead and carbonate of copper, have been opened; some of them appear to be continuations of the Bobby Burns and Apollyon lodes. About 1¼ mile south-east from Lake's Camp are the Hen and Chickens lodes and Mieche's Blow. The former consists of two lodes 2 ft. 6 in. apart, separated by granite. The upper one is from 2 in. to 2 ft. thick, of gossan and quartz, stained with green and blue carbonates of copper, and containing chloride of silver and patches of grey carbonate of lead, galena, and specular iron. It has been followed in for a distance of 100 ft. on the underlay, which dips south south-east at an angle of only 23°.

It has a well-defined hanging-wall, upon which is a similar gossan vein up to 2 ft. thick, sending off ironstone and quartz veins for 6 ft. upwards into the altered micaceous sandstone. The lower lode consists also of argentiferous gossan of variable thickness up to 12 in., and a network of ironstone veins. Six feet to the south both lodes join and thin out; but in places for more than 50 yards along the line of strike it makes again on the surface. The general rock foundations are granite, with chlorite and dark mica schist.

Mieche's Blow is a remarkable occurrence of ore on the summit of a small hill of mica schists and altered sandstones, traversed by granite dykes and quartz reefs. It strikes north-east, and crops out for a distance of 90 ft., varying in thickness from 2 to 8 ft. The lodestuff is composed of porous gossan and coarsely crystalline specular iron, stained with carbonate of copper, and irregular masses up to 2 ft. thick, of concretionary earthy carbonate of lead, passing into patches of undecomposed galena 1 ft. thick. The lode appears to have been a large fissure, originally filled with sulphide of iron, lead, silver, and copper. About 6 chains from it west 39° north there is a smaller output of similar lodestuff.

In anticipation of the settlement of a population, consequent upon the development of the lodes, a new township called Wilson, has been recently surveyed near Lake's Camp, and also another called Parnamoota (formerly known as the Soakage), about 8 miles further to the north-east. Half-a-mile east from Parnamoota is the Pluck Up lode, which consists of a brown iron ore gossan, from 3 to 15 in. thick, containing small veins of pure chloride of silver. It dips south, 40° east, at 38°, traversing mica schist, and has been traced to the surface for a length of about 80 ft. Three shafts have been sunk upon it, the deepest one being about 60 ft. I was informed that 4 tons of ore had been sent to Germany, and there were about 3 tons at grass. Until the lodestuff has been treated in bulk its value cannot be determined, as the chloride of silver is not evenly disseminated through it.

Two miles south-south-east from Parnamoota is the Lubra Silver Mine. The main shaft was 13 ft. deep on two veins or lodes, from 1 to 6 in. thick, and 5 ft. apart, with occasionally smaller veins between them. The veins consist of ironstone containing patches of chloride of silver and grey ore, or carbonate of lead. They dip with the talcose mica schists south 35° east at 45° east: 50 ft. to the south-east is another vein from 1 to 4 in. thick of argentiferous ironstone, with calcite. It has an undulating dip to the north-west, at one part curving up and then flat.

Within 4 chains further south-east three other similar gossan veins, up to 4 in. thick, containing galena and quartz, had been opened for only a few feet on the surface, and also, about 100 ft. north from the shaft, another ferruginous galena vein 4 in. thick. Thus, we have here within about 6 chains, at least, six small silver-bearing lodes of variable thickness and extent; some of them will probably connect one with the other. One parcel of ½ ton of ore is said to have yielded 6000 ozs.; and another of 1 ton, between 300 and 400 ozs. of silver; 26 cwts. had been sent to England, and there were about 1½ ton of ore at grass.

In the adjoining claim of Messrs. Crisp Brothers, 20 chains north 0 east from the Lubra, is a ferruginous galena vein, of variable thickness up to 9 in., in mica schist; and seven chains from this east-south-east is another silver-bearing vein from 2 to 8 in. thick, dipping east at 26°. It had been prospected to a depth of 7 ft.; and from 10 ft. along the outcrop. Mr. Crisp informed me that 3 cwts. of slugs had been obtained, an assay of which had given at the rate of 4800 ozs. of silver per ton. These so-called slugs usually consist of lumps of carbonate of lead containing nests and veins of chloride of silver. They are evidently formed by the chemical decomposition of lenticular masses of argentiferous sulphide of lead, induced by the action of the carbonic acid and chloride salts in solution in the water permeating the rocks. The surface of this country is highly charged with saline matter, so much so that in dry weather the salt covers the ground in places as a white efflorescence about ¼ in. thick. I have seen some of the slugs with a portion of the original galena in the centre still undecomposed.

One mile south-west from the Lubra is the One Tree Hill Mine, owned by Messrs. Nickel, Anderson, and Fisher. A lode from 2 in. to 2 ft. thick of ferruginous quartz has been followed on its underlay, south 35° east at 30° to a depth of about 20 ft. And a few yards from this a similar lode, 18 in. thick, with ferruginous veins, running into the sandstone for 21 in. above it, has been opened; this may join with the other. It contains chloride of silver, &c., and also chalcedonic quartz, with a little iron pyrites. Messrs. Chappel and Allen, of Silverton, inform me that they have just received from England returns of 8 cwts. of the first-class ore sent from this mine, which realised at auction at the rate of 936*l.* per ton, and of 6 tons of the inferior ore, which brought 24*l.* per ton.

About one mile south-south-east from the Lubra a fine piece of ironstone, in size 4 ft. 6 in. by 2 ft., and containing veins and patches of chloride of silver from ¼ to 1½ in. thick, was found outcropping on the surface. It is known as Morris' Blow. The owner had pitched his tent over it, and I was permitted to examine it; but as it was not then allowed to be unearthed from the position in which it was discovered the thickness of it was not ascertained. I understand that the claim was afterwards sold for 8000*l.* This rich piece of ore probably formed part of a short lode. Four other detached thin lenticular veins of ironstone were seen at the surface within a distance of 5 chains, following nearly the strike of the mica schists, north 35° east. In the vicinity the schists are traversed by numerous dyke masses of pegmatite granite and quartz reefs.

About half a mile east from the Pluck Up is Forster's Orient claim, in which four silver-bearing veins had been opened. One varies up to 3 in. thick of galena and ironstone, in small lenticular masses; strike east 20° south in mica schists, with a dyke of diorite on the south-west side. It had been traced for 25 ft. in length and to a depth of 5 ft. Another ironstone vein near this was 6 in. thick; and 5 chains to north-east are two other veins, one 6 in. and the other 12 in. thick, consisting of ironstone and galena. On the outcrop of these, slugs of carbonate of lead and ironstone, containing chloride of silver, had been found.

One mile further east is Nolan's Kangaroo claim, containing a vein of ironstone and galena 9 in. thick, dipping south 20° west at 40° in mica schist, which strikes north 25° east. At the surface some rich silver-bearing pieces of carbonate of lead were obtained. Small dykes of pegmatite traverse the schists. One mile east, 20° south from the Kangaroo lode, is the Model Republic Mine. Here a lode of ironstone or gossan, from 9 to 12 in. thick, dips east, 10° south at 30°, under ferruginous quartzite and micaceous quartz; and 6 ft. above it is another ironstone vein varying up to 4 in. thick, from the surface of which I saw a fine slug of carbonate of lead and horn silver, weighing about 16 lbs., and the lode has been worked for a length of about 60 ft., and to a depth of 12 ft. the ironstone contains chloride of silver.

Nearly 1 mile north-east from here are Mr. Isaac's lodes, which consist of several lenticular veins of gossan and galena, up to 2 ft. thick, traversing in a north-easterly direction altered siliceous sandstone for a distance of 4 chains. These have not been opened, but about 30 yards further along the strike some shallow trenches have been cut in the calcareous mica schists, from which rich silver-bearing slugs are said to have been obtained. In another place a cutting has been made 3 ft. deep, showing thin lenticular veins of galena in the mica schist. Cavities in the ironstone are lined with well-formed crystals of specular iron, which are locally known as "sharks' teeth." Such crystals are of frequent occurrence in many of the lodes. In the same locality, and also towards Mount Robe, and between Parnamoota and Wilson, other similar small ironstone and galena lodes, some containing a little copper ore, have been discovered. This is a country well worth prospecting.

Five miles south-east from Mr. Isaac's, or 2 miles north-west from the Mount Gipps station, is Brade and Nickel's mine, the intervening country being chiefly occupied by a belt of coarsely-crystalline granite (pegmatite), about 3 miles wide, and extending for 7 miles in a northerly direction. Near this mass of granite the schists, which are intersected in all directions by dykes of granite, are much altered, passing from clay-slates into mica schist and gneiss. At Brade and Nickel's mine the surface soil, from 12 to 18 in. deep, covering the mica schists has been found to contain "slugs," or pieces of all sizes up to 200 lbs. or more in weight, of ferruginous carbonate of lead containing horn silver. An assay of one piece of this mixed ore gave at the rate of 3240 ozs. 10½ dwts. of silver per ton, and 32·1 per cent. of lead. About 4 tons of such ore had been obtained by "surfacing" over a space 65 ft. by 35 ft. These lumps of ore are, no doubt, decomposed lenticular pieces of argentiferous galena, which were originally contained in the portion of the schist rock which has been disintegrated; therefore, similar patches of galena are likely to be found in sinking into the underlying schists. Almost surrounding the ground that has been worked, the mica schists, which strike north-north-east, are traversed in all directions by dykes of granite and diorite. About half a mile east from here a small promising vein (Messrs. Nickel and Wilson's) crops out for about 120 ft. north-north-east along the surface. It has not been opened, but appears to be 6 in. thick, and consists of quartz and gossan, with a little chloride of silver and carbonate of copper.

In the adjoining claim of Horne's some rich pieces of ore, containing chloro-bromide of silver, had been unearthed in a small patch of surfacing. In several other claims in this locality silver ore in small quantity has been found.

About 5 miles in a north-easterly direction from Wilson is the Pilgrim Mine (J. Purcell and party's), where a lode of ironstone and schist mixed, from 6 in. to 2 ft. thick (dip south-east), has been opened to a depth of 4 ft., and rich patches of chloride of silver ore have been obtained. A shaft has been put down to cut the lode on the underlay: 5 chains to the north-east is an ironstone and quartz lode, with bunches of galena up to 4 in. thick, which has been opened to a depth of 5 ft., dip south-east, at 30°.

Two chains further north-east is another ironstone vein, 12 in. thick, and 30 yards west from this is a bunchy, ferruginous quartz and slate vein, from 9 to 24 in. wide, dipping south 10° east at 45°. All these veins are apparently separate lenticular portions of the same lode, but may be connected by joints. The mica schists in which they occur are also traversed by large lenticular reefs or blows of white quartz and dykes of pegmatite granite running in various directions, but chiefly along the line of strike of the schists—north-east and south-west.

Messrs. Hawsen and Collins' Christmas Mine lies nearly ¾ mile east-south-east from the Pilgrim. One lode is from 2 to 8 in. thick, and has been worked for a length of 25 ft. and 5 ft. deep. It dips north-west, and consists of ironstone and patches of carbonate of lead, with rich veins of and cavities filled with chloride of silver. Two chains to the north-east along its strike it consists of galena, from ½ to 4 in. thick, and then forms into gossan, passing through schist and into a large mass of quartz. About 6 chains to the east-north-east another ferruginous vein up to 6 in. thick, also striking north-east, has been opened for only 2 ft. deep and 6 ft. in length. Rich pieces of carbonate of lead, with chloride of silver, were obtained from it. Messrs. Hawsen and Collins allowed me to secure one fine specimen, showing chloride of silver plainly, for the Mining and Geological Museum. Another small vein had also been found, but very little prospecting has been done to ascertain the extent of these veins. The country is intersected by numerous granite dykes and quartz reefs.

In the vicinity of Stephen's Creek, near Piesse Nob, a conspicuous rocky hill on the south side of the Wilcannia-road, 23 miles east from Silverton, several small silver bearing veins have been opened. The Eaglehawk lode, 2 miles north of Piesse Nob, is a breccia gossan vein from 3 to 9 in. thick dipping east at 75°, having a hanging-wall of satiny schist, and a footwall of quartz porphyry. It had been sunk upon to a depth of 10 ft., and average sample of the lodestuff gave an assay at the rate of 439 ozs. 7 dwts. of silver per ton. Mr. Dunstan, the manager, told me that small pieces of horn silver had been found on the outcrop. Twelve yards from this is a similar vein, from 1 to 9 in. thick; thev are short veins, and are only visible for a few feet at the surface. The cleavage of the schist is nearly vertical, striking north and south, but the line of stratification dip westerly at from 20° to 40°. About 1 mile further north is the Minerva lode (O'Farrell and Co.'s). A shaft 10 ft. has been put down, and in it the lode, about 8 in. thick, is seen dipping south-east at 65° in talcose schist. The lodestuff consists of quartz and iron ore, with carbonate of lead in patches, and thin layers of horn silver in the joint fissures. On one side of the lode there is a rubbly shale 2 ft. thick, with thin veins of ironstone and marl through it; but the silver ore seems to be confined to the iron ore associated with lead. The lode has only been traced along the surface for about 20 ft. Another small outcrop of gossan is seen 100 yards to the north-west.

O'Farrell's lode is on the south side of Stephen's Creek, about 2½ miles easterly from Piesse Nob. It consists of quartz and brown iron ore, containing green carbonate of copper. The owner informed me that two assays of the ore gave at the rate of 10 ozs. and 640 ozs. respectively of silver to the ton. It dips east 10° north at 40° through calcareous talcose schists, and has been prospected to a depth of 22 feet.

Three miles in a southerly direction from this is Dunstan's lode. A shaft 8 ft. deep has been sunk upon it, showing from 12 to 24 in. of hard, porous, black ironstone, with cavities containing chalcedony. It pinches out 20 yards along the strike to the north-east, but within 30 yards to the south-west it changes into ferruginous finely crystalline vesicular quartz, and 5 chains further makes again into ironstone gossan 3 ft. thick, containing carbonate of copper, and is seen on the surface for about 30 yards. An assay of the hard black ironstone gave no silver, and the copper stained gossan yielded only at the rate of 19½ dwts. per ton. However, the lode has a promising appearance, and should be prospected to a greater depth. Several other small outcrops of gossan and quartz reefs occur in the vicinity. About 2½ miles to the north Mr. Dunstan has opened a gossan vein up to 6 in. thick, containing carbonates of lead and copper. An assay of an average sample is said to have yielded at the rate of 351 ozs. of silver per ton. It occurs in talcose mica schist, and dips south 20° west at 40°.

East of this is another lode of Mr. Dunstan's, consisting of quartz and gossan 12 to 18 in. thick, with carbonate of copper, said to have given on assay 73 ozs. of silver per ton, and 28½ per cent. of copper. In the same locality are several other lodes. One is an ironstone breccia lode 18 in. wide. An assay of a sample of it gave no silver. Another lode (Hawsen and Collins) is 6 to 15 in. wide, dipping east 5° south at 70°, in hard chlorite rock, and has been opened to a depth of 8 ft. It consists of soft ferruginous brown rubble, containing a little chloride of silver. An average sample of the lodestuff gave an assay at the rate of 28 ozs. 19½ dwts. of silver to the ton, with a trace of gold. The schist rocks in this district are highly metamorphised, and traversed by large quartz reefs and dykes of granite and diorite.

About 1 mile south-west from Piesse Nob is Hetherington's lode, which crops out in places at the surface for about 200 yards along its strike, east 30° north. It is from 3 to 12 in. wide, and consists of quartz and ironstone with silicate and carbonate of copper and chlorite. It probably contains silver: 2 miles further on, in the same direction in portion 15, Messrs. G. F. Smith and Brown are working a galena lode. It dips west, 20° north at 55° in garnetiferous mica schist, and consists of granular quartz with galena in masses, 3 in. thick, through it. It had been opened for about 10 ft. along the surface, and to a depth of 10 ft. An average sample of the quartz and galena mixed gave at the rate of 26 ozs. 2½ dwts. of silver per ton, and 40·20 per cent. of load; but the galena if concentrated would, of course, give higher results. The lode has been opened again in the adjoining 14 (White and Foley's), where it is from 12 to 18 in. thick, with patches of galena 12 in. thick, and followed on the surface for about 90 ft. The schists are stained with green carbonate of copper, and on the south-east side of the lode are traversed by large quartz reefs; 7½ tons of galena are said to have been sent away from the mine. Beyond this, in a south-west direction, several similar lenticular lodes up to 2 ft. wide have been traced in A. Kennedy's M.C.P., and also in the next portion of C. Macintyre's. They consist of gossan, with galena and carbonates of lead and copper. Further in the same direction, Mr. Macintyre is opening a lode in portion 16, and also in portion 3. In the former the lode, which dips north-west at 75° with the schist rocks, to from 1 to 5 ft. thick, composed of porous gossan and quartz, with galena and carbonate of lead. The galena occurs in bunchy veins from 2 to 6 in. thick. The shaft is 35 ft. deep. In portion 3 the lode somewhat resembles the last, and is from 3 to 4 ft. wide. It has been opened to a depth of 8 ft. Mr. Macintyre gave me a fine specimen for the museum, showing the characteristic mode of occurrence of the veins of galena in quartz.

In portion 7, at the Round Hill, Messrs. Hawsen and Collins have a similar lode. It crops out in the side of a steep hill, and where it has been opened it is from 4 to 6 ft. wide, but about 25 yards from this on either side the outcrop is only 1 ft. wide. It dips west 35° north at 50°, and consists of ferruginous quartzose rock with patches of galena and carbonates of lead and copper. An average sample, taken across the whole width of the lode, gave on assay at the rate of only 4 ozs. 9½ dwts. of silver per ton, and 5·75 per cent. of lead, which shows that the quartz and gossan matrix is poor in silver; but it is probable that the patches of lead ore disseminated through it will contain silver in payable quantity.

To the west of this in portion 18 (Messrs. Hawsen and Collins) is a large lode of quartz and griesen from 10 to 20 ft. wide, cropping out above the surface for a length of about 200 ft., and coated in patches with green carbonate of copper; it has not been opened. From the surface indications it evidently does not contain copper ore in sufficient quantity to be workable for copper, but it should be prospected for silver. It occurs in altered schists, and strikes north-east and south-west. About 100 yards from it to the south-east, there are large quartz reefs and a dyke of diorite.

IOTA.

Sydney, Oct. 1.

GOLD COAST MINING COMPANY.

SIR,—It is a pity your correspondent, "N. R. H.," should have headed his letter, published in the *Mining Journal* of Oct. 25, Gold Coast Mining Company, seeing, as it afterwards appears, he was not speaking of that company at all, but of another—the Wassau. I would advise, therefore, to prevent mistakes any further communication from him to be headed Mining on the Gold Coast—Wassau Mine. It seems he is not satisfied with the directors and staff, because the promises made have not been fulfilled. I take it, therefore, he knows but little of mining matters, as the experience of all interested in mines—Indian, West African, American, or elsewhere—is that such is unfortunately the rule. But he has a remedy; let him attend the yearly meeting, and complain, or at once with other shareholders convene a meeting, and do what the shareholders in the Gold Coast Company did—appoint a committee of enquiry. With respect to that company the result was this—a new board. On raising of more capital, the reduction of London expenses to a very small sum, the calling in of a well known practical engineer to consult with the directors and manager, a plan formed for the profitable working of the mine, a detailed account furnished of the maximum monthly expenditure at the mine (488*l.*), and also of the estimated returns (848*l.*), showing a profit per month of some 360*l.*, with a promise moreover of doubling the returns on employing more miners. There can be no doubt if the manager performs his promise, and since his return to the mine he says he can, that the company will be to its shareholders and to the neighbouring mines a second Mysore.—*Nov.* 19.

J. B.

A FEW WORDS ON MINE REPORTS.

SIR,—One of the first things that must strike a practical man in reading over the various reports by the managers of foreign mines, as they appear in the columns of the *Mining Journal* from week to week, is their utter indefiniteness, the total lack of anything on which a stockholder can base the slightest calculation as to whether his stock is worth anything or not. Taking the Journal of Oct. 25, just received, and now before me, and analysing these reports, it would seem that faith in things not seen is an absolute essential for a stockholder in foreign mines. In the issue in question there are but two mines where actual business-like reports are given; there the managers give their output, its value per ton, and the net profits over all expenses, and even of these two, one is much more explicit than the other. Now in these there is something tangible, the stockholders can, like the old Scotch elder, who, when asked if he could preach, claimed that he could at least draw inferences. The stockholder can draw inferences as to whether he will get a dividend or not. On the other hand, however, in one of these reports we find that "The quartz prospects well. We anticipate finding good quartz. Only small quantities of gold to be obtained." And again "Fair prospects are obtainable."

Now what is there in these expressions which are merely samples of the whole on which a stockholder can figure? Absolutely nothing. Again, let me quote from another of these precious reports. Here they are—"The stone looks well, but is getting small. The footwall and hanging-wall are coming together, but I expect they will open again in a few feet. I hope to crush 1000 tons which ought to prove whether payable or not." And again "The stone looks well enough to be payable." In another the report indirectly shows the mine to be pocketty, and I believe it has yet to be shown that a pocketty mine ever was a paying one. In this same report the "leader," which I interpret to mean the pay-streak in the vein, is stated to be 12 in. wide, and of the right description to make specimen stone. There is the rub. This specimen stone business is what takes in a great many stockholders. In the same report the leader, alias pay streak, is quoted as being in another part of the mine 10 in. wide, and presenting indications of making rich stone. And again in another part of this report the rock is said to be of a congenial character, whatever that may mean. In still another part the leader is said to be of a promising character. That is just what is the matter—promising, but not performing.

There is not a word in these last quoted reports, and they are merely taken as samples of others, to show the actual expenditure or income—not a solitary word. They only show that the stockholders money is being expended without giving the first glimpse of the results. Pocketty mines, and mines where the pay-streak is only 10 or 12 in. wide, require very rich ore to compensate for the extra amount of dead work required to get it out, as the miner would at the least possible calculation have to drive his shaft and levels 4 ft. in the clear. It would be better for the stockholder to stop throwing good money after bad as the saying is, and accept the results. Some of these mines have been in existence for years, and have done nothing but absorb the stockholder's money during the whole period of their existence. They are in every case non-dividend paying mines, and their stock is quoted at a mere fractional part of their par value, while their stockholders have been buoyed up with what?

Why, with highly drawn expectations in most cases never to be realised.

It may, I think, be accepted as a fact that when a mine has been in existence for a number of years, when it has been sunk several hundred feet with from 1 to 10 levels driven at different depths to various lengths, sufficient has been done to prove the property, and if after all it does not pay the stockholders had better button up their breeches pockets and cry—hold enough!

Las Vegas, N.M. Nov. 6. JOHN ROBERTSON, M. AND C.E.

MONTANA COMPANY.

SIR,—At the Montana meeting, on Nov. 19, we had confessions of mismanagement, such as it has never yet before been my lot to listen to. The Chairman, while admitting how badly the property was managed at the mines, falls back upon the value of the quartz not being as good as it was represented to be. Yet, if he refers to a circular issued to the shareholders some months after the company took possession, we were informed that the average results of their assays gave "a considerably higher value than that on which the prospectus of the company was based, and does not include the strings of rich ore." It is not surprising that shares went to a premium when the directors declare they find things better than even the promoters' valuation showed it to be. It is difficult to reconcile Mr. Smith's report with the results shown in this circular; but it is unnecessary to do so, as the milling results for October show the uselessness of his sample assays—out of 48 assays all but 13 show a much lower assay value than the mill returns.

No one who knows anything of mining will attach any importance to sampling unless a large quantity is treated, and Mr. Smith's conclusion that the lode carries a large amount of gold and silver is the best contradiction to his table of assays. From an examination of the milling results I observe that the returns suddenly fell in the very month the new mill commenced to work from $49·30 to $13·14. Are we to believe that the mine feel in value in all parts to this extent? Is it not more likely that the mode of treatment of the ores was changed and produced such unfortunate results? I see from Mr. Smith's report the new mill is stamping only to a coarse state of division; but Mr. Darlington's report showed that very fine stamping was necessary; he describes the gold as being very fine, and known as flour gold, which necessitated fine stamping and special appliances for recovering a satisfactory portion of the assay contents. F. J. K.

CHILIAN COPPER MINING.

SIR,—The report and accounts just published show that the Copiapo Company for the 12 months ended June has made a profit of 10,697*l.*, enabling the directors to declare a final dividend of 1s. 6d. per share, making a total for the year of 6*l.* 8s. 4d. per cent. The capital of the Copiapo Company, with no prior charges before it, is 174,212*l.*, in 4*l.* shares, with 3*l.* 10s. paid. The shares are at 32 per cent. discount, and I think I can discern one reason for the market valuation.

The directors of the Copiapo Company appropriate to themselves no less a sum than 1000*l.*, "exclusive of income tax"—almost 10 per cent. of the divided profits, or 11s. 6d. per cent. on the capital of the company. Now, I do not begrudge a fair and liberal allowance to directors when the concerns which they manage are prosperous; but when, as in the case of the Copiapo Company, the dividend is reduced 40 per cent.—from 10*l.* 14s. to 6*l.* 8s. 4d.—it seems scarcely right that the directors should take so large a proportion of the profits. The Articles of Association give the Copiapo directors 700*l.* per annum; but about two years ago, after a dividend had been declared of 12½ per cent., a large shareholder (who afterwards parted with his shares at a premium) proposed at the general meeting that the remuneration of the directors (five in number) should be increased to 1000*l.* per annum. Needless to say that the resolution was carried, the market price of the shares being then over 4*l.* per share. Now, I maintain that a foreign mine is managed locally, the head office in London exercising a very limited control over the manager on the spot. The functions of the directorate being, in my opinion, mainly ornamental, ought not to be too costly. I trust that this question will be ventilated at the approaching general meeting of shareholders, and that the Copiapo directors will make some concession, if it be only to accept the obligation of paying the income tax on their own fees.—*London, Nov.* 19. B. C. J.

SHROPSHIRE LEAD MINES.

SIR,—It is reported generally in this district that operations will be resumed at several of the mines on the turn of Christmas, and it appears several of the agents and many of the men are waiting and hoping for this. The Snailbeach Company have washed up several hundreds of tons of lead ore since the smelting chimney stack fell, and they cannot smelt it until they rebuild the said chimney. We have been told that this work will be begun very shortly. It is the hope of the inhabitants of the neighbourhood of the district that his Lordship the Marquis of Bath will concede much easier terms of royalty in any new arrangement with the company. In several places in the district some few of the miners are opening adit levels, &c., in search of lead ore, and we have no doubt that if some little assistance is afforded them in this line many thousands of tons of lead ore, blende, and carbonate and sulphate of barytes will be raised without the use of pumps at all, as the lodes are to be seen at surface traversing these massive mountains, and lead ore is to be seen in them in places, and very little done in the shape of day levels. And we feel sure that if small capitals were raised for the purpose of opening the old adits and extending them, and driving new ones, good shallow mines would soon be opened, giving a fair interest on the capital thus expended, and employment to the local miners. MINER.

MINING LEASES, AND MINING MANAGEMENT.

SIR,—I have looked in vain in last week's *Mining Journal* to find the letter of your correspondent, Mr. H. Wilson, of Nov. 8, backed by others more able than myself to write on the subject. The letter goes straight to the point and must speak its own commendation to all who, like myself, have placed money in various mining speculations as amateurs, not thinking that such one-sided arrangements existed as the letter exposes, which is (so far as the lords are concerned), "Heads I win, tails you lose." As a mine shareholder of four or five years' experience I can only add that the knowledge gained and the money lost in my various ventures compels me to say, that English mining as now carried on puts money into nobody's pocket but that of vendors, promoters, directors, and such people, employed either directly or indirectly at the mines.

I was strongly recommended to try Cost-book companies, as the money was much more likely to go towards *bona fide* mining, and was thus induced to embark in one or two (in what is supposed to be one of the best offices); but here again I have to complain of such a loose management of affairs as to shake my faith entirely in all mining. I find for example that while we poor amateurs have to pay down our cash and pay our calls sharp when due, that the big men who sign the Cost-book for 500 to 2000 shares are permitted to hold such shares for a year or two without paying a penny upon them, and that members of the committee continue to draw their fees, although calls long in arrear (owing by them) are yet unpaid. The above arrangement is sufficient to show that a more unfair manner of conducting a mine could not well be devised, as it allows all the advantages to be gained should a mine turn out well, while all the risk and burden is placed upon other shoulders, besides the risk of losing the whole amount due upon such unpaid shares.

Under those and many other adverse circumstances I have come to the conclusion that English mining must for the present cease to be a fair and legitimate investment, and have felt constrained to advise friends not upon any account to touch mining properties until not only a fair and proper arrangement is made between lords and leaseholders, but a much better management be generally adopted, and those who have so loudly complained of late about the difficulty in raising fresh capital for carrying on what are termed progressive and promising mines had better set about making the much needed reforms, so as to give the general public a little more confidence. If shareholders would only take more personal interest in their own affairs much good might thus be effected; but usually some half-a-dozen gentlemen assemble when a mine meeting is called, and more than half of those are either the members of the committee or others connected with the management, and so they have things all their own way.

I have endeavoured to show that whilst the present terms of granting mining leases are most unfair and unjust in the broadest sense of the words, there are other abominations connected with the present system of managing our mines which require as radical and complete a change as the matter of granting leases before fresh capital (just now so greatly needed) can be looked for, and not until these changes are made can we reasonably expect or look for that healthy revival of our mining industry. Seeing how great the need for substantial reforms if mining in this country is to be fully resuscitated, I follow up the sensible and urgent appeal of Mr. Wilson, and ask you through the medium of your valuable and excellent Journal to come to the front, and help in putting these things right, and so prove the *Mining Journal* to be what it has always been—the pioneer and champion of all that is calculated to advance such an ancient and noble industry as that of *bona fide* mining. W. S.

Harleaden, Nov. 11.

PROCESSES FOR GOLD EXTRACTION.

SIR,—I have read in last week's *Mining Journal* a letter from Mr. Jordan, in answer to one from Prof. Huntington on Nov. 8, and I wish to correct a mis-statement therein. Mr. Jordan says he did not apply for the manufacture of Prof. Huntington's amalgamator. Last year, at the commencement of the summer, a notice appeared in the *Mining Journal*, calling attention to Prof. Huntington's amalgamator. Mr. Jordan thereupon wrote, saying he had seen the notice, and soliciting the manufacture. These letters are still in Professor Huntington's possession. Mr. Jordan followed this up by calling several times at the professor's laboratory. On one occasion I was with Professor Huntington when Mr. Jordan called, and in my presence and hearing he suggested to the professor that, as he was a manufacturer of mining machinery, and also advertised the same largely, it would be very desirable that he should make the amalgamator, saying, at the same time, that he had patented a first-rate pulveriser, which could be worked in conjunction with the amalgamator, and that he would push the two patents together for the benefit of all parties concerned. Prof. Huntington referred Mr. Jordan to my father, Mr. J. E. C. Koch, who was then secretary of the Pyrites Smelting Company, owners of the Huntington and Koch patents. Very shortly after Mr. Jordan called on my father, at the offices of the company, and I was present during the whole interview. Mr. Jordan made the same offers and suggestions as he had made to Professor Huntington. My father informed him that the company had not decided on any manufacturer, nor did they wish any particular pulveriser to be tacked on to the amalgamator, as they meant only to use the best in the market; but that the proposal should be laid before the board, which was accordingly done. On Oct. 30, 1883, the board finally decided not to appoint any manufacturer for the time being.

In the meantime Professor Huntington had sent an order to Mr. Jordan for a pulveriser for crushing large laboratory samples, but the order, which had at first been solicited by Mr. Jordan, was ultimately declined, Mr. Jordan stating that as he could not work with us he would work against us. This is a widely different reason from that given by Mr. Jordan in his letter for not supplying his pulveriser. People can now judge of the veracity of Mr. Jordan's other statements. His letter is certainly very ingenious, but scarcely ingenuous.—*Threadneedle-street, Nov.* 18. ERNEST C. KOCH.
Director Pyrites Smelting Company.

THE VAN MINE.

SIR,—As I believe I am the person referred to in Capt. A. Francis's letter, in the *Mining Journal* of Nov. 8, who differs from Capt. Hodge as to the advisability of continuing to sink Edwards' shaft, I will ask you to give me space to state my reasons for doing so. Having placed my views before the directors, and those gentlemen having decided to follow Capt. Hodge's advice, as, I will say in justice to them, they were almost bound to do when that advice was backed, as it was, by our own manager, I would rather not have made them public; but as I have been pointedly referred to in your columns, I think it is due to myself and to some other shareholders in the Van Mine, who are rather guided by what I say, to state openly the grounds on which my opinion is based.

Edwards' shaft was begun several years ago in the most prosperous period of the mine, when there was every appearance of the great shoot of ore continuing to a great depth, and extending far to the west of Seaham's shaft. It was placed, as was thought at the time, sufficiently to the south of the outcrop of the lode to cut the lode somewhere about the 150, if I remember rightly. Expectation has been disappointed on both these points; the lode became valueless some distance east of Edwards' shaft, and in consequence of its rapid underlie this shaft passed through it I think between the 90 and 105. The present bottom of the shaft is 40 fms. north of the lode, which is here dipping south 6 ft. in 6 ft., so that if the lode continues downwards at the same angle by the time it reaches the 150 a cross-cut 70 fms. long will be required to open a communication between it and the shaft—a disadvantage which will go on increasing as the mine gets deeper. Except the new discovery in the 120 cross-cut south there is no sign at present of anything in the western portion of the old mine sufficiently valuable to justify the expense of sinking Edwards' shaft, and making the long cross-cuts necessary to reach the lode from it, as the short piece of ore ground in which the winze in the bottom of the 120 has been sunk can readily be explored and worked through that winze.

Capt. Hodge, in last week's Journal, says, "Time is money."—a maxim which is true conditionally, but not absolutely. The requisite condition in this instance being that there is a certainty of finding a valuable mine at the 150. I doubt if Capt. Hodge is sanguine enough to promise this a certainty. "Time," alas! will not restore us the money in sinking Edwards' shaft if nothing is found at the bottom, and 7500*l.* economically managed is little enough to do all that is well worth doing at the Van before this mine is utterly condemned. This, however, is not my only reason. The most promising point at present in the mine is the new discovery in the 120 cross-cut. This discovery, I am inclined to think from the short examination I was able to make of it, is a new lode, which is striking away south from the old lode at an angle of at least 40°, and so getting from Edwards' shaft even faster than the old lode. If my surmise is correct I think Capt. Hodge will agree with me that the most minerlike way of developing this new lode will be to sink a new shaft on it wherever it is found best after a thorough exploration of it. As I have said above our new capital will be little enough to sink a new shaft and develope this new lode, if when explored it proves as rich and extensive as I hope and think it will do. But it may not prove rich and extensive; and then with little or nothing at the bottom of the old mine, and this highly-praised new discovery a failure, what sort of a monument will Edwards' shaft be to the wisdom of the authors of its existence? My advice is the same as that of the time-honoured Mrs. Glasse—"Catch your hare before you make costly preparations for cooking it." W. H. GATTY.

Market Harborough, Nov. 17.

THE VAN MINE.

SIR,—Referring to a letter of Capt. T. Hodge in last week's *Mining Journal*, I may say, on the subject of whether the ore left in the different stopes should be worked on tutwork or tribute, that it should not make much difference as to the profits in taking it away, as a fair price in either method of working should produce fair wages to the miner; and, perhaps, from the reading of Capt. Hodge's report he thought the principal part of the ground would be worked on tutwork, for he says:—"The stopes between the two shafts from the 60 fm. level downwards will produce from 45 to 60 tons of lead a month for (say) two years, and can be got away at a profit of (say) from 10*l.* to 12*l.* a month with the present price of lead. When convenient, tribute might be set at so much per ton of dressed ore." The principal difference would be in the greater and better securing the ground if wrought on tutwork than on tribute in a lode 30 ft. wide; and, if tribute is adopted, it is sincerely to be hoped that no disaster may occur to men or mine.

The really important matters are these. It will be seen by Capt. Hodge's report that the old mine is capable of giving from 100*l.* to 120*l.* per month profit at present prices of lead, and to do so for two years to come. All parties are agreed that a rich course of ore for 40 ft. wide has been seen in the sole or bottom of the cross-cut driven south in the 120 fm. level, and that the sump-winze when inspected had been sunk through a course of ore, producing for the part carried from ¼ to 1½ ton per fathom, and was within 2 fms., or three weeks of reaching the 135, when previous to the liquidation of the company, and the raising of 7500*l.* from the shareholders it was intended to open out and prove the mine east and west from the sump-winze, and which was the only legitimate and miner-like way of doing so. But if this proved rich what was to be done with the money that the shareholders were called on unnecessarily to supply? The fact is it was not wanted, and it then occurred to some one's imagination that Edwards' shaft should be sunk to the 150 fm. level, and instead of opening out the mine at the 135 fm. level to sink the sump-winze also to the 150, and it was only to get the sanction of some mining agent on whom they could depend to put these matters right and straight. The shareholders should know the truth, which is that Edwards' shaft, as matters turned out, was badly placed in the beginning, and may be compared to a bull coursing a hare, the further he ran the further behind, for the deeper this shaft was sunk the greater the mess, and the further away it got from the workings, so that all the money expended in sinking this, amounting to many thousands of it, has been thrown away, and should the money raised be squandered away in sinking it further the parties who sanction such a proceeding should be held personally responsible for the amount so expended, and if the mine should not prove rich at the 135 it would amount almost to a certainty that neither would it be found better at the 150 fm. level, and after a delay of three years in spending this money the mine would be ruined, whereas by opening out the 135 fm. level at the present moment in six months the property would be proved, and the shares would be worth more pounds than they are now quoted at in shillings. ABSALOM FRANCIS.

Goginan, Aberystwith, Nov. 18.

GOLD EXTRACTION.

SIR,—In last week's *Mining Journal* you published a letter from Mr. T. R. Jordan, in which he thinks fit to give the lie direct to the statements contained in mine of Nov. 8. There are, Sir, I conceive, two classes of people who would adopt this course; to one class would belong a person who, conscious of his rectitude felt that a gross injustice had been done him, to the other class a person who, knowing the statements made regarding him to be true and indefensible, determines to brazen the matter out. To which of these two classes Mr. Jordan belongs I must leave it to those whom it may concern to ascertain for themselves.

It is a matter of indifference to me what Mr. Jordan does or does not; I have no ends to serve but those of fair-play. In my opinion the Times was wanting in its duty to individuals and to the public when it published a long article endorsing Mr. Jordan's claims to novelty for his so-called process. Before a gold-extraction process, no matter who may be sponsors for it, receives a long notice in any newspaper claiming influence it should have been practically and successfully at work for at least one year at one or more important mines. The sooner this is generally understood the better for the public and for the reputation of the paper. The public would not long tolerate "puffs" in the Times. I should never have put pen to paper in this matter had not the article in question appeared.
A. K. HUNTINGTON.

Metallurgical Laboratory, King's College, Nov. 20.

DEVON GREAT CONSOLS DISTRICT.

THE EMILY COPPER MINES.

In the midst of the general depression in metals it is gratifying to see that the directors of the Emily Copper Mines are sanguine that another rich prize in this famous district has fallen into the hands of their shareholders. The reports show that large deposits of copper ores are already proved, and that sales will commence forthwith—to leave considerable profit. The machinery is all driven by water-power, so that the ores can be raised and dressed at much below the average cost. A circular has just been issued to the shareholders which states that the property is now fully equipped, and that the lodes at the 62, 72, and 82 fms. levels are being opened up with all possible speed. The ore between the 72 and the 82 is very rich, and the bottom level—the 82, is the richest, which confirms all that has previously been stated, that the ore increases in quantity and improves in quality as depth is attained. The lodes are similar in character to those of the celebrated Devon Great Consols, which, in the same run of ore ground, returned a profit of over a million sterling.

Some time ago Capt. Peter Floyd reported that "the Emily lodes run about east and west, and are going west towards the granite with similar indications to the Devon Great Consols Mine." Capt. Charles Parkin confirmed this by stating—"I was struck with the similarity of the ground at the adit (in the Emily Copper Mines) with that of the Devon Great Consols." These opinions are being daily proved; the three lodes are now near to each other, and there is no doubt whatever that they are the outcome of an immense mass of ore, which appears to be close at hand.

A winze must now be sunk between the 72 and the 82 to open up a large body of ore, and on a further outlay, not exceeding 250*l.*, they will, it is considered, be able to raise and sell at least 100 tons dressed ore per month at an excellent profit, and there will be no difficulty in gradually increasing the quantity up to 200 tons per month at a much larger profit. Under the agreement of purchase made between the vendor and the company the subscribers to the 5*l.* preference shares at par are entitled to fully-paid ordinary shares of 1*l.* each at the price of 5s. each; that is, for each preference share subscribed for the subscribers will be entitled to five ordinary shares at the price of 5s. each, but this privilege will cease on Dec. 1. Subscriptions are now invited for the unallotted capital on these advantageous terms.

Based on the minimum produce of 100 tons of ore per month, it is estimated that the net profit, after payment of the full amount of the preferential interest, will be 1900*l.* for distribution amongst the 30,000 ordinary shares, giving over 25 per cent. per annum on the present subscription price, whilst with increased sales, increased profits must, it is believed, accrue.

SNAEFELL MINING COMPANY.—The directors' report and statement of accounts, prepared for the forthcoming meeting, have been issued to the shareholders. The accounts show a balance in hand of 685*l.* 17s. 7d. The report states that owing to the short time which has elapsed since the last meeting the directors had nothing much to report upon; but refer the shareholders to the agent's report, which was subjoined. This states that the 130 fm. level had now been driven nearly 15 fms., now being nearly 318 fms. from the shaft. They were driving on the west part of the lode, the width being 4½ ft., all of it carrying ore, though variable. A rib of lead blende about 1 ft. wide, and a good rib of lead about 5 in. wide, were visible. Altogether this is a very valuable lode. In the 100 fm. level the lode is disturbed. The new rock-drill has been set to work in this end, and it seems to do its work very well. The surface machinery had been thoroughly overhauled, and all both above ground and below was in good working order. Alterations are being made to the dressing machinery which, when completed, will render it almost automatic. Advantage had been taken of the dry weather to clean out and enlarge the reservoirs.

Mr. WILLIAM GRAIN, notary, of Gresham House, Old Broad street, has been appointed a Commissioner of Deeds for the State of Florida, U.S.

TECHNICAL EDUCATION IN NOVA SCOTIA—KING'S COLLEGE SCHOOL OF CIVIL ENGINEERING.

The re-arrangement of the School of Arts, of Civil Engineering, and of Divinity, in force since October at the University of King's College, Windsor, can scarcely fail to add materially to the efficiency and popularity of the institution throughout the maritime provinces, and is calculated greatly to encourage the study in King's College of those branches of technical science the general acquaintance with which is essential to the commercial progress and permanent welfare of Nova Scotia, New Brunswick, and Newfoundland. Enjoying the honour of being our oldest Colonial University, and the only university out of the United Kingdom with a theological faculty connected with the Church of England, King's College had—notwithstanding the facts that its statutes were exceptionally liberal, that it offered an abundance of free scholarships which cleared the earnest student of nearly all expenses up to and including the B.A. degree, that it was open to students of all denominations, and that it had a competent staff of professors—been at the disadvantage of being looked upon as an aristocratic, exclusive, and High Church establishment which it was rather dangerous to enter, in spite of the educational benefits so freely offered. By the new arrangement this disadvantage will no longer exist, for not only are the several schools now distinct, but the organisation of the Divinity School—now separate from the Arts School—has been so modified as to include all lines of thought, from Broad Church to High Church, and to secure complete and liberal teaching. This change, like all others and wherever they are introduced, has met with some opposition, but whilst it has strengthened the University by satisfying all Churchmen in the maritime provinces it has permitted such vast improvements in the Arts and the Civil Engineering curricula, by relieving them of the divinity bias, which before and of necessity interfered with them, that the practical portion of the community interested chiefly in the development of the mineral and commercial wealth of the provinces will now appreciate them much more highly.

It has always been urged in the columns of the *Mining Journal* that the development of the natural resources of a country—mining, metallurgy, engineering, lumbering, and so on—are much more likely to be successfully and profitably carried on under the superintendence of native officials than under that of outsiders, even though those outsiders be Englishmen, provided the natives be sufficiently educated in technical and scientific subjects to qualify them for employment anywhere; and for years past—under How, Oram, Spencer, Butler, and others—King's College, Windsor, has offered ample instruction, although for the reasons stated the classes have not been so well attended by others than Churchmen, as could be wished. At present there is a distinct English Literature course for the School of Civil Engineering, so that the student therein will not be troubled with either the theological bias required by divinity students, or the moral philosophy bias usually observable in an arts course, and thus it may be hoped that the number of King'smen engaged in the development of the mineral and industrial resources of Nova Scotia, New Brunswick, and Newfoundland—the Inspector of Mines for Nova Scotia is, among many other local mining and civil engineers, a King'sman—will largely increase. And that there is ample room for development, so far as the minerals are concerned, is beyond question, since the production of Nova Scotia alone in 1883 was:—Gold, 15,446 ozs.; iron ore, 52,410 tons; coal, 1,422,553 tons; gypsum, 144,668 tons; coke made, 44,189 tons; limestone, 26,477 tons. In all these cases the products showed a considerable increase over those of the previous year. The total of the coal sales in 1883 amounted to 1,297,523 tons. There was an increase in the exports to the United States and to all the other markets that are open to Nova Scotian coal. The increase in the yield of gold, although not so large as in the year before, is still satisfactory, being, with the exception of 1877, the largest since 1871. The average yield per man for the 12 months was $2·84 per day. Since 1862, when the precious metal was first worked in Nova Scotia, 350,916 ozs. have been raised. In the coal mines of the province 4635 persons are employed, and 226 pits are being worked. The coal sales have increased since the confederation of the Dominion in 1867 from 471,181 to 1,297,523 tons. In the 10 years ended 1870 the total was 4,927,339 tons, whilst in the 10 years ended 1880 it was 7,377,428 tons. This large increase has taken place notwithstanding that the American markets, formerly open to Nova Scotia, have been practically closed since 1866. Between 1854 and 1866 there was no duty upon coal in the United States; but since that time a duty has been levied, which has decreased the exports from 400,000 tons in 1866 to 102,000 tons last year. There are probably few fields for mining enterprise which offer greater attractions to capitalists than the maritime provinces of Canada, and it cannot be doubted that as scientific and technical knowledge becomes more widely disseminated, the mines and industries of those provinces will be widely and favourably known in the British markets.

SAFETY SHOT-FIRING IN MINES.

This truly important and ever anxious question of safety shot-firing in coal mines has again and again been brought forward and discussed by those interested in safely mining coal, but it is regrettable to find that very little up to the present time has practically been done by mining engineers to solve the most difficult and pressing problem of our time. Although many ingenious attempts have been made but little substantial encouragement or help has, it is understood, been given to the few who have earnestly worked and brought forward the most practical methods for preventing, or, at least, minimising the continual recurrence of disastrous explosions and fearful loss of life, especially where traced to shot-firing, and such as occured last week at one of the pits of the Tredegar Coal and Iron Company, freely admitted to be one of the very best ventilated and appointed in South Wales, that hotbed of explosion. Truly, when well managed pits like this—and explosions seem to be the rule in such pits—are overtaken by terrible accidents, it appears to afford no real security, and seems a hopeless task to overcome the treacherous effects of the carburetted hydrogen floating in the atmosphere and pent up in the fissures and goaves of the mine. When these fail it is surely high time to look to some other more efficient means of preventing these sad catastrophes by attacking the fountain head of the evil.

Notwithstanding the enormous expense incurred in the very best of management in pits, we have here an established and important fact, and often proved before that it is absolutely no security against explosion when such is clearly traced to gunpowder, the acknowledged cause of too many of these disasters. Should we not at once, then, employ the best remedy to attack and rob explosives of their danger, and so reduce the powder charge to a minimum, and disarm or destroy its dangerous weapon of flame—the primary source of ignition of the gas—by thus circumscribing its proportions and confining the flame to the far end of the bore-hole, and quench it with water or some chemical liquid before it can issue forth from its prison with its usual uncontrolled destructive tongue of fire? The influential deputation which waited on the Home Secretary last week has the sympathy of the entire nation, for it is well known that the owners do not want to see their property recklessly destroyed, nor do the miners, who accompanied them, wish to wilfully sacrifice their lives by using explosives, and were it practicable to avoid their use they would be the first to discard them and save themselves from the terrible risk they are forced to continually encounter. The above suggestions should be carefully considered, as they might lead both owners and miners to neutralise the fruitful source of their dangerous position, especially where they are compelled to employ explosives. These ideas are not volunteered to tantalise them on imaginary grounds, but are based on facts connected with recent important experiments, and if the reports to hand are correct in all particulars an advance has been made to a practical position in mining safely, efficiently, and economically, with explosives that has never before been reached, as the results obtained are of the most satisfactory nature, and must surpass anything that has hitherto been done in this direction.

From time to time many attempts have been made to supersede gunpowder, but without the same practical results and equal economy, and although the compressed air cartridge made a near approach to what was supposed to be required, and did its work safely and well, still its heavy cost and complicated arrangements caused it to lose favour, and it has been thrown aside. Then the old well known principles of the lime cartridge were revived with improvements, and burst into vivid notoriety for a time, and had full justice and exhaustive trials everywhere in England and Scotland, but it has also not realised the great expectations and practical efficiency claimed for it, and so warmly advocated by its best well-wishers, although it was evident to practical men from the very first that its slow action in working would largely rob it of power, and prevent it from always bringing down the coal, except in special seams with a good roof, and has now entirely lost the confidence of the miners, and has, it is said, been practically abandoned, as not only costly but unreliable, and too troublesome to work. The hydraulic or water cartridge is another safety system, but it acts in a totally different manner from those mentioned. A tube containing water is combined in the bore-hole with an explosive charge to neutralise the dangerous effect of the flame, which it quenches, and from all accounts it produced good results, and did efficient work, and possesses the merit of great simplicity. It has been purposely kept in abeyance, but it is now declared that it will play a conspicuous part shortly in combination with a new chemical explosive cartridge (invented recently by the same active mind), and which, like water, also extinguishes flame, combined with other important advantages, besides producing a large economy in explosives. It is perfectly harmless in itself, and will so reduce and circumscribe the explosive charge to the smallest area that when it is combined with the water cartridge, which transmits its power, absolute destruction of the explosive flame must take place, and at the same time the powder charge is efficiently detonated, when complete combustion is thus secured of the usually imperfectly consumed grains at the far end of the bore-hole before they have time to escape into the workings and fiery atmosphere of the pit. This is a brief outline of the improved system, already foreshadowed, of using explosives in fiery mines, and seems to contain the elements of safety while working in the presence of the treacherous fiery gas which has caused so many disasters, and should at least command the earnest attention of colliery owners and engineers, not only on the score of safety but also of economy, and it is hoped that in any experiments likely to result from the deputation to the Home Secretary this system will obtain its merited consideration.

MINING AND METALLURGICAL PATENTS.

Supplied by Mr. ERNEST DE PASS, of Fleet-street, E.C., Fellow of the Institute of Patent Agents.

Amongst recent applications for patents, in which the readers of the *Mining Journal* are more immediately interested, are the following:—

A. J. New, London, No. 14,842, Machinery for rivetting and punching metal plates.—J. J. Crooke and R. Crooke, United States, No. 14,853, Treating copper matt.—E. Cheswright, London, No. 14,860, Manufacture of metal foil, and apparatus or means employed therefore.—R. Lawrence, London, No. 14,918, Apparatus for polishing granite.—R. Stone, London, No. 14,930, Smelting, and apparatus connected therewith.—C. Haselhorst, Dresden, No. 15,013, Process of producing a coating for protecting metal goods against rust or oxidation.—J. Sheldon, London, No. 15,029, Manufacture of polished and annealed wire or sheets of iron or steel, partly applicable to annealing other articles of iron or steel.—E. Probert, San Francisco, No. 15,057.—Process of working auriferous and argentiferous arsenides and sulphides of iron, copper, or other similar substances by litharge or lead.—R. R. Savours, Bilbao, No. 15,108, Process for desulphurising coal and other minerals.—M. Würfel, Bochum, No. 15,117, Machine for manufacturing corrugated sheet-metal tubing.

The following selected specifications have been recently published, and are now open to inspection and opposition:—

APPARATUS FOR SUPPLYING AIR AND STEAM TO FURNACES, TO CAUSE MORE PERFECT COMBUSTION OF FUEL.—R. H. Hepburn, London, No. 85.—A series of nozzles, from which steam and air are injected into the furnace, are supplied with steam from one common steam chamber in connection with the boiler.

POT FOR MELTING METALS AND OTHER SUBSTANCES.—J. Harsant, Twickenham, Middlesex, No. 109.—A deflector ring is placed over the rim or upper edge of the pot.

AMALGAMATING GOLD AND OTHER METALS AND APPARATUS THEREFOR.—B. C. Molloy, London, No. 143.—Refers to a process for forming electrolytically amalgams of hydrogen or hydrogen and a metal electro-positive to hydrogen. The ore is carried over the surface of mercury or amalgam of the fluid metal.

TREATING SULPHIDES AND OXIDES OF METALS, AND OBTAINING PRODUCTS THEREFROM.—Sir F. C. Knowles, Ryde, Isle of Wight, No. 603.—The minerals are freed from silica and earthy matters, and in the case of sulphides calcined in retorts, the products of calcination, sulphur, arsenic, or both being collected. The oxides are treated first in retorts and afterwards in a melting furnace.

PRODUCTION OF YELLOW METAL, PARTLY APPLICABLE ALSO TO THE FOUNDING OF BRASS AND BRONZE GENERALLY.—T. Parker, Wolverhampton, No. 1223.—Copper, spelter dross, spelter, and tin are mixed together in certain proportions.

AMALGAMATING APPARATUS.—A. Miller, London, No. 9151.—Consists of a vessel charged with mercury, into which the ore to be operated upon is fed, so as to issue at the bottom into a second vessel, also charged with mercury, in which the material is caused to ascend in such manner as to bring it into intimate contact with the mercury.

A REFRACTORY SUBSTANCE TO BE EMPLOYED IN THE CONSTRUCTION OF APPARATUS FOR USE IN METALLURGICAL AND OTHER CHEMICAL OPERATIONS OR PROCESSES IN WHICH AN ELEVATED TEMPERATURE IS EMPLOYED.—J. H. Johnson, London (a communication from J. B. Mallion and Son, Turin), No. 9817.—Refers to the employment of a mixture of roasted or calcined and caustic magnesia.

METHOD OF GETTING UP STEAM IN STEAM-BOILERS, AND APPARATUS THEREFOR.—A. W. L. Reddie, London (a communication from W. Craig, Brooklyn, U.S.A.), No. 12,416.—The water is uniformly heated by steam from a supplemental boiler previous to lighting the fires.

MASON COLLEGE.—A crowded meeting of artizans was held in the Chemistry Theatre on Monday evening to hear a lecture by Professor BRIDGE "On a Piece of Chalk." In introducing the lecturer, Mr. T. Bunce said—The trustees felt the deepest interest in extending the usefulness of the College to the artizans of the town, an object, which, he knew, was one of the dearest wishes of the founder. Professor Bridge said that in the last lecture of that series "On the Botany of Beer" Professor Hillhouse showed how great an activity belonged to a most insignificant form of plant life—the yeast plant, upon which the production of alcohol depended. He (Professor Bridge) who was more concerned with the study of animal life, felt a little jealous when he saw how much activity could be attributed to that insignificant plant, and he thought that when his turn came he would endeavour to show that there were animals in the world quite as insignificant in size which were quite capable of giving rise to results in the economy of Nature which even the yeast plant could not afford to despise. Having described the wide extent and thickness of the beds of chalk over the world, the lecturer said that there were three persons whom they might question as to the nature and origin of a piece of chalk. The geologist could tell them a little, but only a little. The chemist could tell them that it was composed of carbonate of lime, and that if acid was added to it, or if it was subjected to much heat, carbonic acid gas was given off and pure lime remained. The microscopist, however, was able to tell them that it was composed to the extent of 85 to 90 per cent, of exceedingly minute shells in various states of preservation or decay, and that these formerly belonged to marine animals. This conclusion was borne out by the investigation of the bed of the Atlantic Ocean in the Challenger Expedition. It was found that the ocean bottom was largely covered by a greyish-white ooze, which, when microscopically examined, showed the presence of low forms of microscopic animal life, known as globigerinæ, which had shells of the same kind as those to be found in chalk. These creatures existed alive in the water of the sea in immense numbers, and the chalk deposits were evidently due to the raining down upon the bed of the ocean, through long ages, of myriads of their shells. Professor Bridge described the structure and method of sustenance of these animals, and said that, when really looked at, a piece of chalk told an eloquent story of the past history of a considerable portion of the world.

FOREIGN MINING AND METALLURGY.

The cold weather, which has been rather impatiently awaited by Belgian coalowners, has at length imparted some little activity to deliveries of household coal in Belgium. A good winter demand for household coal will be doubly welcome this year upon the Belgian markets in view of the crisis in the sugar trade, and in view also of the depression in metallurgical industry. Coalowners have been compelled to reduce production in the centre district, and it is even now doubtful whether a revival in the household coal trade—a revival which has not yet taken place in a serious fashion, but which is regarded as probable—would sensibly modify the general condition of the Belgian coal mining interest. Negociations which have been for some time pending between colliery proprietors in the Lower Rhine and in Westphalia for a reduction of production during 1885, have just resulted in failure. This result has not only evoked surprise, but has also excited regret, as it was only proposed to reduce the production to the extent of 5 per cent., and not to attempt to fix prices at a uniform level. The failure of the negociations is attributed to the excessive sub-division of colliery property, which is one of the characteristics of the Westphalian basin, and which rendered it necessary that the consent of from 160 to 180 collieries should be obtained before any common or united action could be taken. The extraction effected in the Sarrebruck basin in October is returned at 569,752 tons.

Notwithstanding that a rather better tone has appeared in the Iron Trade in England and Germany, the Belgian blast-furnaces must be said to be in a precarious condition. In proof of this, it is stated that the Athus Company has issued a tariff for casting pig which is based upon slightly low rates, so as to contend against the competition of the Longwy forges. Hard refining pig has continued to be quoted in Belgium at 2*l.* per ton, ordinary pig at 1*l.* 16s. per ton, and mixed pig at 1*l.* 12s. per ton. There has been no change in iron and plates, but more activity is observable in the manufacture of certain specialities, such as girders. It is stated that some small works in the neighbourhood of Liége, which have not the good fortune to produce specialities, will be shortly closed. The budget of the Netherlands State Railways for 1885 proposes an expenditure of about 1,000,000*l.* The aggregate value of the production of mining and metallurgical industry in Lorraine in 1883 is returned at 2,632,069*l.*, as compared with 2,602,163*l.* in 1882, showing an increase of 29,906*l.* last year, or 1·13 per cent. There were 18 ironstone mines working in Lorraine last year, besides nine mineral bearings open to the day. The province had also two collieries, seven salt springs, and nine metallurgical establishments in operation last year. The nine metallurgical establishments owned between them 20 blast-furnaces, 10 rolling mills, 11 iron foundries, &c.

Merchants who have been selling iron of late at Paris at 5*l.* 12s. per ton are stated to regret having done so, and to be unwilling to now do business below 5*l.* 16s. per ton. In the Nord it would now be difficult to find sellers at 4*l.* 16s. per ton; the current price is rather 5*l.* 4s. to 5*l.* 8s. per ton at the forges. In the district of the Loire and the Rhône the state of affairs is so bad that production is being reduced as much as possible. At the Navy Steelworks, at Givors, there are now two out of three furnaces out of blast; at Chasse, one out of two; and at Terrenoire, two out of three. Many of the workpeople have been discharged, and wages have been reduced to the extent of 10 per cent. At Firminy the management is said to regret having relighted a blast-furnace two months since. The St. Etienne Steelworks having only a limited production, and having adopted specialities are in a relatively good condition. The Pont-l'Eveque Ironworks have two furnaces out of blast; these works are said to have lost 7400*l.* during their last financial year. Creusot, thanks to its considerable and varied production, remains in a relatively prosperous state. The Northern of France Railway Company has just ordered 30,000 tons of steel rails from the Aire Company in the Pas-de-Calais, the delivery of these rails is to be spread over 1886, 1887, and 1888.

TECHNICAL EDUCATION IN SOUTH WALES.—The presentation of prizes and certificates to the successful students belonging to the Cwmavon Science Classes was made on Nov. 12 by the Rev. T. Humphreys. The following interesting particulars are taken from the report of the committee, read by Mr. T. A. Southern. The classes were instituted for the purpose of giving instruction in science to young men of the neighbourhood. The classes are under the superintendence of the Science and Art Department, from whom they receive monetary grants, and whose examinations are held in May. The subjects chosen to be taught at Cwmavon were mining, mechanics, and steam. All of these are intimately connected with the daily work of persons engaged at a colliery, and are also very useful to others. It was, perhaps, due to this, and to the fact that a science class had not been held at Cwmavon before, that the project was very well received, and 25 pupils were enrolled at once. At the examination 12 pupils were passed in steam, 13 in mechanics, and five in mining, out of 16 examined in each subject, the average being 62½ per cent. The proportion in steam was 75 per cent., in mechanics 81 per cent., and in mining only 31 per cent. The low standard in mining, a subject of which the pupils might be expected to know a great deal intuitively, is much to be regretted, and the committee can only think that the want of success was due in no small measure to the need for descriptive answers in that subject; and especially so as the questions were simple, although not such useful practical ones as one could wish. In the kingdom there are about 500,000 persons engaged in mining, employed in not less than 4000 collieries and mines. The Science and Art statistics for the whole of the United Kingdom show that at the last examination only 346 were examined in mining, so that if all these persons were engaged at mines, which is not the case, the fact remains that not more than one in 1500 of those persons is studying the theory of his work at a science class. Again, only 25 mining classes have been held during the winter, or, say, one to every 160 collieries; whereas every mining village should have one. Of these classes no less than 10 were held in the county of Durham, while Monmouthshire and South Wales, which produces 15 per cent. of the output of the kingdom, had none except that at Cwmaman. It may also be mentioned that in South Wales and Monmouthshire there were last year only two classes in mechanics, at Cardiff and Cwmaman, and only three classes in steam, at Cardiff, Cwmaman, and Llanelly. These facts express very clearly that the work has not yet become so well-known in this coal field as it deserves to be. If the publication of these facts will give any stimulus to the formation of these classes in the colliery villages, a great good will result. Any person, whether self-taught or otherwise, may sit for examination by applying to the committee before March 25, and paying a small examination fee. The prizes and certficates having been distributed the meeting concluded with an interesting lecture on the safety-lamp.

NORTH MEXICAN SILVER MINING COMPANY.—Capt. Emanuel Jennings, for many years underground agent (under Messrs. John Taylor and Sons) at the Fortuna Mining Company, Spain, and subsequently underground agent at the Nacupai Mines, has been selected by the North Mexican Silver Mining Company as underground agen of their mines at Cusihmuachic. He starts immediately.

The Ouro Preto Gold Mines of Brazil (Limi ed) have receive remittance of 383 ozs. of gold, value 1559*l.*

THE IRON AND STEEL WORKS OF THE UNITED STATES.

A new edition of the American Iron and Steel Association's directory has just been published, under the superintendence of Mr. James M. Swank (the secretary), with corrections and additions to Sept. 1. The following particulars taken therefrom will be interest- to our readers. A complete summary of the number and capacity of the works described in the present edition as compared with that which accompanies the last has been made by Mr. Swank, and is as follows:—

Iron and steelworks.	Sept. 1, 1884.	July, 25, 1882.
Completed blast-furnaces	675	685
Blast-furnaces building on Sept. 1, 1884—ten bituminous, two anthracite, and four charcoal: total	16	30
Annual capacity of completed blast-furnaces in pig-iron, net tons	9,300,000	8,000,000
Annual capacity of the bituminous furnaces, net tons	4,850,000	4,125,000
Annual capacity of the anthracite furnaces, net tons	3,175,000	2,750,000
Annual capacity of the charcoal furnaces, net tons	1,275,000	1,125,000
Completed rolling-mills and steelworks	434	400
Rolling-mills and steelworks building	4	16
Rolling-mills making rails	71	80
Single puddling-furnaces (a double furnace counting as two single ones)	5,295	5,018
Heating furnaces	2,782	2,598
Train of rolls	1,555	1,424
Annual capacity of rolling-mills in finished iron and steel, net tons	7,800,000	7,000,000
Rolling-mills having nail factories	81	66
Nail machines	5,695	4,030
Nail factories building	2	2
Nail machines, to be used in the new factories	67	158
Completed Bessemer steelworks	21	15
Bessemer steelworks building	1	1
Bessemer converters on Sept. 1, 1884—46 completed and 3 building	46	36
Annual capacity in ingots, net tons	2,490,000	2,150,000
Completed open-hearth steelworks	35	27
Open-hearth steelworks building	3	5
Open-hearth furnaces on Sept. 1, 1884—58 completed and 5 building	58	51
Annual capacity in ingots, net tons	550,000	400,000
Completed crucible caststeel works	41	35
Steel-melting pots	3,594	3,490
Annual capacity in ingots, net tons	115,000	105,000
Miscellaneous steelworks	6	6
Steel manipulating works	55	47
Completed forges, making wrought-iron from ore	70	72
Annual capacity in blooms and billets, net tons	75,000	75,000
Completed bloomaries, making blooms from pig-iron	53	53
Annual capacity in blooms, net tons	70,000	70,000

From this table it will be seen that there was a decrease of 11 in the number of furnaces between July, 1882, and September, 1884, although between these dates many new furnaces were built, a large number of badly-located ones were pulled down, some to be definitely abandoned and some to be rebuilt; 38 were thus demolished, and only replaced by 27. There was an increase of 11 bituminous furnaces, and a decrease of 4 anthracite and 18 charcoal furnaces. While the number of furnaces was 11 less in July, 1882, the nominal capacity has increased from 8,000,000 to 9,300,000 tons in 1884. This estimate of capacity represents the highest possible production by all the furnaces if they were all in operation at the same time, and running under the most favourable conditions. The actual capacity is probably 25 per cent. less than the nominal estimate given, or 6,975,000 tons instead of 9,300,000 tons. Of the 675 furnaces described in the directory it is the deliberate judgment of the author that not more than 600 are in blast or ever will be.

The number of rolling-mills and steelworks has increased by 34 since July, 1882, 45 new works were built and 11 were abandoned. Most of the new works were built to make nails and spikes, and the nail machines have increased since 1882 from 4030 to 5695. Bessemer steelworks have also increased, there being now 21 against 15 in 1882, besides one in course of erection. The number of converters has increased by 10, and of completed open-hearth works by eight, while there are three in course of construction. Crucible steelworks have increased from 35 to 41, and the number of steel melting pots from 3490 to 3594.

Looking through the directory itself we notice that the Kent Iron Company's furnace, Litchfield, in Connecticut, has been rebuilt, and has an annual capacity of 4500 tons. In New York the Niagara River Iron Company's furnace, at Buffalo, is now idle, and offered for sale; its annual capacity is 12,000 tons. The Chesnut Hill Iron Company of Columbia, Lancaster County, Pa., contemplates building a large modern furnace, to take the place of its abandoned No. 1. Mr. Robert H. Coleman, of Lebanon, Pa., contemplates building two large stacks at Cornwall, one of which is partly under way. There is little movement in Pennsylvania so far as bituminous coal and coke furnaces are concerned. In Kentucky a company of English and Scotch capitalists, of which Sir Titus Salt, of Saltaire, England, is the leading member, entitled the Dayton Coal and Iron Company, have commenced the erection of two coke-furnaces at Dayton, Rhea County, under the management of J. H Ferguson. The furnaces, 5 by 20, are to be equipped with six Whitwell hot-blast stoves, and are to have a total annual capacity of 100,000 net tons. Furnaces are projected at Colton, San Bernardino County, California, and by the Tacoma Steel and Iron Company (an English concern), at Tacoma, Washington Territory. Work on the second furnace of the Oregon Iron and Steel Company, for which all the material is on hand, at Oswego, Clackamas County, Oregon, is for the present abandoned.

With regard to rolling-mills it is noticeable that most of the new mills are located in districts which have not hitherto given much attention to iron manufacture in any form. Minnesota, Iowa, and Texas have each built a rolling-mill for the production of bar-iron since 1882. These are the first rolling-mills in their history. We note that at the Frankford Steelworks, Adam Tindel, Frankford, Philadelphia, a 5-ton Siemens-Martin furnace is building for the production of steel for railroad axles, locomotive forgings, and hammered steel shapes of all kinds, with an annual capacity of 1500 net tons of axles and 1500 tons of general forgings. The erection of an additional hammer shop, to contain two 5-ton hammers, will also be soon commenced. At the Keystone Horseshoe Company, Philadelphia, a new mill was completed in 1884, containing two heating-furnaces and a continuous train, consisting of one set of three-high 16 in. roughing-rolls, one pair of 16 in. strand-rolls, two pairs of 10 in. rolls, and four pairs of 8 in. rolls. The Bethlehem Iron Company has in course of erection a 28 in. train for steel rails, beams, and heavy shapes, and a mill with a new Siemens-Pernot steel plant, consisting of two 15-gross ton open-hearth furnaces, one Siemens heating-furnace, 12 gas producers, two hydraulic hoists, cranes, &c. The Mount Hickory Iron Company, of Erie, Pa., is making the plans for rebuilding on a much larger scale the mill destroyed by fire in December of last year. In Ohio the Cleveland Steel Company, of which Mr. J. H. Clark is President, contemplates adding an open-hearth plant; while Summers, Brothers, and Co., of Struther, Mahoning County, are going to add another sheet mill and a plate mill, with nine double puddling and two heating furnaces, a hammer, and all necessary machinery. In California the Pacific Rolling Mill Company has added during the current year an open-hearth steel department, with a daily capacity of 30 tons; and the Union Iron-works of San Francisco proposes to erect a rolling mill for the production of iron and steel ship-plates.

IRONWORKS' PRACTICE, AND THE FACTORY ACTS—IMPORTANT DISCUSSION.—An important paper on the operation of the Factory Acts was delivered before the South Staffordshire Institute of Iron and Steel Works Managers, by Mr. C. C. W. HOARE, H.M. Inspector of Factories for South Staffordshire, at their monthly meeting at Dudley on Nov. 15. Mr. W. J. Hudson (President) occupied the chair, and there was a good attendance. Mr. Hoare reviewed the different attempts at factory legislation, and the Acts themselves from 1802 until 1878, when they were consolidated. This Consolidated Act was now in force, and was the one which had to be carried out. It provided that children employed in non-textile establishments should work only either before or after the dinner hour, and if they worked in morning and afternoon sets they must change turns at work on Saturday morning. No child under 13 years was allowed to work unless he or she attended school half-time. The owners of ironmills and blast-furnaces might work young people at night, but not for a longer period than they might work by day, and not day and night together. The hours must be either between 6 and 6 or 7 and 7, for those in the night turn as well as the day. In ironmills such children could not work more than six nights in a fortnight, and at blast-furnaces no more than seven nights. Young people who worked day and night turns could not claim a half-holiday. One and a-half hour should also be allowed for meals. In blast-furnaces the lads might work on the Sundays, but not on double turns. It was also illegal for lads to be on the ground before 6 A.M. or 6 P.M. The discussion was begun by Mr. G. B. Wright (Wolverhampton), who asked for information in respect of the State control in this matter by continental nations and the United States?—Mr. Hoare replied that, speaking from memory, he believed that continental operatives worked about 72 hours per week. They took longer time over their meals, and he had been assured by a manufacturer that with Oldham operatives and 60 hours a week he could turn out as much work.—Mr. M. Millard created much amusement by saying that he had known a sick society whose members were composed not only of the boys and girls but of the engine, and the horses and donkeys. He had also seen girls puddling as well as getting behind the forge and piling the mill. He was under the impression that it was for the half-timer and not for the employer to obtain the certificate of school attendance. Was he right?—Mr. Hoare: No; the employer must get it.—Mr. Millard announced that he had tossed half-timers over because he did not like them. As to meal times he wondered whether if the operatives had 20 or 25 minutes at one time, and possibly an occasional half-hour, making up two hours a day for meal times, that would be complying with the Act?—Mr. Hoare: The Act definitely says that the meal times shall be half-an-hour each time.—Mr. W. Yeomans: But suppose they get more than that time by getting at odd intervals 10 minutes?—Mr. Hoare: That would not meet the Act.—Mr. W. Farnworth, jun.: Suppose the boys go to work at 5 o'clock in the morning?—Mr. Hoare: You must not permit them, since you have no right. Ironmasters have been allowing the puddlers to do as they like, and now they do not care to tackle them upon this point.—Mr. H. Perry: The section operates very hard. It is a difficult matter to comply with it.—Mr. R. Smith-Casson, general manager at the Earl of Dudley's Ironworks: The prevention of the boys from being allowed to work before 6 in the morning is a hindrance to the iron trade. It is to their interest to manufacture as cheaply as we can, especially in times of depression like the present, and if we are to do so we must follow up the heats so as to save fuel. I fail to see why a lad cannot be employed from 5 A.M. to 5 P.M. If Mr. Hoare could induce the authorities to alter the Act he would be doing a great service to the district. It also seemed preposterous that we should be limited to lads of 18 for half-timers. In my opinion 15 years is ample. I believe that in Austria, where the ages were fixed at the same as they are here, they have been prejudicial to the introduction of skilled labour. This being so it has been altered, and a similar course will have to be pursued here, as we are labouring under the same difficulty.—Mr. Hoare replied that the only power to alter the Acts was Parliament. As to the age, he believed it was possible to get full-timers at 13 years of age, since when a child had passed Standard IV. it could work full time. He believed five out of six children could pass the standard.—Mr. Smith-Casson enquired whether if an ironmill worked day and night it could work till 4 P.M. on Saturday.—Mr. Hoare: Work on Saturdays as other days.—Mr. Smith-Casson: The only way out of the difficulty, then, is to work on Friday nights.—Mr. Hoare: You can only work six nights in a fortnight.—Mr. Smith-Casson: And then about the half-hour on Saturday?—Mr. Hoare: The Act provides that where there is a market day on the Saturday you can alter your half-holiday from the Saturday to the Monday, or any other day.—Mr. Smith-Casson: That meets the difficulty.—On the motion of Mr. Ashton, seconded by Mr. R. Smith-Casson, the hearty votes of the meeting were accorded to Mr. Hoare from his paper, which was ordered to be printed. Mr. Hoare having replied, the meeting terminated.

WEST CORK—ERRONEOUS COLOURING OF GEOLOGICAL MAPS.

We are informed that West Cork has recently been visited by a gentleman connected with the Geological Survey of Ireland with the view of new colouring the geological maps. Our old correspondent, Capt. W. Thomas, has, therefore, addressed the following letter to him on the subject:—Every person connected with West Cork mines will be glad of justice being done at last to one of the greatest industrial sources of wealth in Ireland, and having myself been intimately connected with the development of the mines and mineral resources of West Cork, Kerry, and other counties, during the last 44 years, you will perhaps be good enough to excuse me if I differ *in toto* in opinion as to the geological formation of West Cork from the late Prof. J. Beete Jukes, and his subordinates, which they have described as red sandstone. This is not only a palpable error, but calculated to do incalculable injury to the mining interest of the country, for no man in his senses would expect to find a good copper mine in red sandstone, and many gentlemen in London and elsewhere, when asked to invest money in West Cork mines very naturally refer to the Government geological maps as the highest reference and authority, and when they find the whole country described as red sandstone they laugh at the idea of expecting to find good mines in such a formation, and will not invest 1s.

We have in Cornwall primary and secondary granite. In West Cork we have primary and secondary slate rocks, with some grit-rocks, schistose formations, &c. These are the prevailing rocks (the killas of Cornwall and Devon), and very rarely can a small bed or patch of sandstone be found. Mr. G. H. Kinalean in Memoirs of the Geological Society, page 20, remarks:—"In the copper zone the beds are generally clay or greenish slate or shale, the killas of the miners, with a few purple beds, associated with grey and purple grits and a massive light green coarse grit or sandstone; this latter rock is considered by the miners 'to be highly productive of copper.' This green sandstone is called by the miners elvan or helvan, and some of them consider it to be the same as the elvans of Cornwall; but I need scarcely say that they are quite different kinds of rocks, as these are of aqueous origin, while the Cornish elvans are igneous." Is Mr. Kinalean quite sure that the Cornish elvans are igneous rocks? Some years ago a specimen of Cornish elvan and a specimen of Irish elvan was sent to the Museum of Irish Industry, Stephens' Green, Dublin, and the *savans* of the institution could not discover which of the specimens was Cornish or which was Irish. At page 8 of the memoirs Mr. Kinalean says—"Through the whole of this group calcareous bed or cornstones occasionally occur, which are of various appearance, often having a brecciated look as if angular fragments of slate were embedded in calcareous paste; another form they take is that of cellular grit when weathered, the cells being full of bin-oxide of manganese or peroxide of iron, but the common form is a rotten, dark brown, rusty stone. When the cornstones contain copper they are locally called gossan lodes. They occur in beds, patches, and lenticular masses. Sometimes a bed can be traced for a long distance."

I cannot discover what Mr. Kinalean intended to convey in the foregoing paragraph; probably it is a description of a gossan lode. I may remark, however, that gossan consists of ferruginous quartz, peroxide of iron, iron pyrites, oxides and carbonates of copper, &c. A true gossan is a never-failing indication on the top or back of a lode of rich metalliferous deposits underneath, and the Germans have it—

> That a lode in order to be rich and fat
> Must always wear an iron hat. (*i.e.*, gossan.)

Mr Kinalean further remarks, in Memoirs, pages 23 and 24:—"Faults that run across, or oblique to the lodes, are called by miners either cross-courses or flookan-courses, and that where marked in the map, at about 3 furlongs on the east of Schull Harbour (in Coosheen Mine), there is nearly a north and south cross-course or fault. This has been proved to be a compound fault, as it splits into three as it goes both north and south from the old lode. In the year 1860 or 1861 I explained to Mr. Kinalean the position and direction of the great cross-course to which he refers. I also pointed out that in its course south from Coosheen Mine it cuts through the Calf Islands, and also the western end of Cape Clear, and forms the north and south harbours in that island; also going north it makes the Gap of Mount Gabriel, and in its course further north a grand deposit of the sulphate of barytes occurs in the Dereenalaman Mountain. This great cross-course continues its course northward to and beyond Durrus, until it makes the Gap in the mountains north of Classadeo, forming the road to Rooska and Kellovinogne Silver-Lead Mines and Bantry Bay. I have, therefore, traced it across country from Bantry Bay to Cape Clear. In the absence of those great metalliferous cross-courses I should look in vain for largely productive mines, because all experience proves that unless east and west metalliferous veins are intersected by cross-courses, slides, flookans, &c., large quantities of mineral are never found. As an illustration of this subject, it is a fact that in contact with the great cross-course running south from Tuckingmill through Brea Valley, in Cornwall, are to be seen the most extensive and richest mines in the world. Some few years ago the late Mr. Lisabe, of Dublin, and others, including myself, attacked the late Mr. Jukes on the folly and incalculable injury he had done to West Cork by describing it in the Geological Memoirs and maps as red sandstone, and colouring the maps as such. The result was, that Mr. Jukes wrote a long letter to Mr. Lisabe, which was printed, in which he stated that what we called killas in Cornwall was sandstone, and was the same kind of rock as the sandstone of West Cork. Nobody, however, except Mr. Jukes and some of his subordinates, believed in his theory, and the fact remains that Cornish killas is not sandstone, nor is the rock formation of West Cork composed of sandstone, and the sooner the false colouring is washed out of the geological maps the better. Let justice be done. Let the maps be correctly coloured, and the formation of West Cork properly and truly described, and a glaring evil and injury to the country removed for ever.

Recently a member of one of the most eminent firms in Europe (Messrs. John Taylor and Sons, London) crossed the Kilcrohane Mountains with me. He was pleased with the mineral character of the clay-slate formation, but he saw no sandstone. Mr. Dickinson, Her Majesty's Chief Inspector of Mines, has often inspected the district in question over and under ground, and if his official duties permit of his giving his opinion I think he would pronounce it to be clay-slate. Mr. Rathbone, a gentleman of great attainments as a geologist, mineralogist, &c., states most decidedly that West Cork is not a sandstone formation. Messrs. Chipman and Rowe, mining engineers of great experience in Cornwall, Devon, Westmoreland, Cumberland, East Indies, &c., now engaged in the mines of this district, state most positively that they can find no sandstone, and from between 40 and 50 years' experience in this country I say, and I do not care who says to the contrary, that West Cork is not a sandstone formation, and to continue the colouring on the maps as such would not only be perpetuating a farce but doing an incalculable injury to this country.

I have been many years endeavouring to have the errors of the sandstone question corrected, and all rock formations described by their right and true names, and in order to accomplish this if I have used strong expressions I beg you will not think for a moment that I had the remotest idea of making personal remarks.

FREE TRADE AND FAIR TRADE.—Referring to an article in the Times commenting upon what he said at Sheffield on the subject of Fair Trade, Lord Dunraven replies:—You observe that I "eccentrically characterise" clerks as "people of no occupation." This would, indeed, be an eccentric description of clerks, but it is not mine. I referred in my speech to three distinct classes—people of no occupation, clerks, and minors, and in this I followed the return issued in the early part of the year by the Postmaster-General, and analysed in the Economist of Feb. 23. This return proved that the number of depositors in Post Office Savings Banks among artizans and labourers had seriously declined, and that, as the Economist said, it "cannot properly be taken"—as it was taken by Lord Granville recently—"as one of the measures of the progress of the savings of the working classes." The Economist characterises the returns as a "fallacious standard." The expression which I used, and to which Lord Granville objected, was that they afforded "a delusive test." It was stated at the Sheffield meeting that out of 13,481,000*l.* deposited by the working classes in the savings banks of the country 11,800,000*l.* was withdrawn. These are facts which are totally ignored—whether in a spirit of fair play or not I leave others to decide. You are good enough to say that "Lord Dunraven probably maintains that the nation has been subsisting by a consumption of its old surplus profits." I dare not ask for enough of your space to enable me to discuss this question properly. I will only observe that you have attributed to me an argument which I never used. That the present depression has extended over a period of 10 years is not my unsupported statement. I have no doubt of its accuracy, as I derived it from the Times and Mr. Gladstone. You observe that Fair Traders would do well to devote their surplus energy to the work of "deepening the existing channels of trade with Greater Britain.' This is precisely what we wish to do. Our programme defines it as a main point of our object "to promote an extension of trade between the mother country and her colonies and dependencies." The Times having thus adopted one-half of our "platform," I am encouraged to hope that it will in due season adopt the other half—"to obtain such changes in our laws as shall prevent the products of foreign states from unfairly competing with the products of home labour," and give us the great benefit of its full support.

SOUTH AUSTRALIAN MINING.—An Adelaide correspondent (Oct. 6) writes:—There is an excellent opportunity now for capitalists willing to invest in certain mineral properties in this colony. I know of nickel (antimonial N.), also of silver, in South Australia, as well as many other minerals that deserve attention, asbestos among them. It is difficult to get people here to go into mining, as the brokers at once do their best to "kill the goose that lays the golden eggs." The brokers are the *betes noir* of mining in this country—a curse to the place. But if an English company or proprietary took up mines here, our brokers would not have the chance to meddle with their shares. We have some new discoveries of gold, promising well, and our older gold mines are decidedly improving. From what I have seen in our colony since my return from Silverton I quite expect we shall find some good silver mines here; in fact, two or three discoveries have already been reported. Our colony has not yet been half explored for mineral wealth.

INDIAN AND COLONIAL MANUAL AND DIARY.—The second annual edition of this very useful volume—that for 1885—has just been issued, many important additions, which materially enhance the value of the book, having been made. The British possessions are carefully classified according as they are situated in Asia, Australasia, America, Africa, West Indies, Atlantic Ocean or Indian Ocean; and with respect to each possession mentioned there is an excellent historical and commercial outline, as well as lists of the legislative councils or their equivalent, and of the judges, and details of the customs' tariffs. The mineral wealth of the several possessions is fully and fairly referred to, and thus the entire book is made interesting and readable whilst conveying all the information men of business are likely to require. The publishers—Messrs. Arthur H. Wheeler and Co., Strand—have evidently spared no expense in the preparation and printing of the volume, so that with its interleaved diary, a week at an opening, it is both a handsome and useful book for the merchant or exporter.

THE NICKEL COMPANY.—The directors of "Le Nickel," Paris have issued a circular announcing the amalgamation of their company with the New Caledonia Mines Company, of Glasgow. The registered offices are to be in Paris, but the business of the combined companies will be carried on by a committee of the board of directors at Glasgow, under the original style of "Le Nickel." The company will now be in a position, it is stated, to supply nickel and cobalt ores in unlimited quantities, and having associated themselves with the most skilful and experienced refiner in the trade, they have sought to guarantee that the product of their refineries shall stand unsurpassed in the market. The mines in New Caledonia having now been fully opened out, and their extent proved, the company can, without fear, enter into large engagements.

SOUTH AFRICAN DIAMOND MINES.

At the Kimberley Mining Board meeting on Oct. 21 the engineer reported that the notice cancelling the engagements of the board's platelayers expired at the end of last week, since when they have ceased to be employed. The engineer requested the board to take into consideration the ways and means for the payment of the wages of these men, now three months in arrear. The movement of the standing reef as registered, was as follows:—Nos. 1, 2, and 4 gauges, each 1-16th of an inch; No. 3, 3-32nds; Nos. 5 and 6, each 3-16ths; No. 7, 1-32nd. The slips were opening at the north-west of the mine, and it could not be long before Robinson and Co.'s box would come down. On the south-west the movement was increasing, but as yet there was no indication of a fall from the margin.

With reference to the payment of the platelayers, Mr. Staib said the board might make arrangement to collect 100*l.* to wipe debts of this description off the books. The Chairman remarked that the Central Company had not only paid its *pro rata* share for August, but when the sanitary department of the board was about to collapse the company paid 150*l.* to keep it going. It was time some other companies made grants, seeing it was absolutely necessary in order to keep the board going. Mr. Staib said he had made an advance of a couple of hundred in cash on the August and September rate, although certain objections had been made to the rate in consequence of which it was not confirmed by Government. He was still, however, willing to give a *pro rata* share. The Chairman: The Central Company have advanced 900*l.* in cash to this board to keep things going. The last advance of 150*l.* was to save the sanitary department from smashing up. We looked upon it as such good work that was being done by the department in the face of this epidemic that we considered it would be a thousand pities to let the work drop. We have made the advance, and I think the Sanitary Inspector's report—which says that "there have been no case of small-pox within the mining area during the past week, and that to-day is the 15th day since the last case was sent to hospital"—repays us for the expenditure. If we had allowed our vigilance to abate some 20 days ago we would have been in a different position to-day.

The certificates sent in from companies showed the following reef work done since last meeting:—French Company, 3400¼ loads; Central, 2926 loads; Standard, 1960¼: total, 8286½ loads. The matter of drainage from the Standard Company's claims into those of the Central Company, and the recent decision of the arbitrators in reference thereto, then came up, and the attorney gave his opinion in reference thereto. The Chairman said he did not think they could do better than follow Mr. Haarhoff's suggestion, as he said there was not the slightest doubt that clear proof was given that sluits had been cut and water led, and the arbitrators decided simply because the bye-law did not cover the case. The evidence was there to prove what they (the Central) alleged had actually taken place, and that this water had been led, but the bye-law did not cover the case. Mr. Haarhoff's advice was to wire to Government and ascertain whether there was no chance of bye-law 14 being sanctioned. By sanctioning it they rescinded the old one.

It was ultimately resolved—"That the Chairman wire to Government asking whether bye-law 14 will be sanctioned, as in the meantime the mine is suffering great inconvenience through its non-approval." Mr. Robinson objected to the motion being put without notice. The Chairman, after consulting Mr. Haarhoff, said he was very pleased the attorney was present; he had asked him whether it was necessary to give notice of motion, and he said no. Therefore he ruled that the proposition was in order. On being put the motion was carried. Mr. Robinson voting against. Mr. Robinson had his protest recorded against the motion being put without a week's previous notice having been given, according to the rules of the board. He had beaten the attorney on other points, and thought he would do so again on this one.

The DIAMOND MARKET, says the Daily Independent of Oct. 25, has been dull the whole week, most classes of goods are weaker, and prices of coloured stuff continue to fall. Subjoined we give the returns of the production, import and export, of diamonds for the month of September, as published by the Diamond Mining Protection Association. Compared with August the following changes are noticeable:—Decrease in weight of diamonds produced 650 carats, in value 2665*l.*; Kimberley contributes 12,000*l.* more, De Beer's 3000*l.* less, Dutoitspan 1000*l.* less, and Bultfontein 10,650*l.* less to the total of production this month; while imports are of about the same value, and exports show a reduction of nearly 7200*l.*

The NORTH-EAST MINING COMPANY of Kimberley Mine, whose report and balance-sheet is published in our advertising columns, has, like the companies generally in the Kimberley Mine, been greatly obstructed in its operations by the heavy fall of reef which recently took place. In presenting the report and balance-sheet for the quarter, the directors could not point to very much work having been done. The work, however, which was done, showed how wonderfully rich are the claims owned by the company. On June 30 there were 2450 loads of blue on the floors, since which 2347 tons have been hauled and deposited, and 4297 tons washed, yielding 9249 carats of diamonds, which realised 11,161*l.*, being at the rate of 51s. 11½d. per load. The profit for the quarter was 4750*l.*, of which 3362*l.* was applied to the payment of the debt brought forward from the previous quarter, and 1397*l.* remains in hand. The reef slip the directors regard as a benefit, a large quantity of reef previously lying in the company's high block having been shifted away. The company is now entirely free of debt, and has a balance at the bank, and as it soon will be able to resume work it has an assurance, if no further reef slips happen, of entering on a period of great prosperity. The directors, in concluding their report "congratulate the shareholders upon the strong and sound position which the company now holds." The progress made by this and the European Company has been due to unremitting attention on the part of the directors, and effective and economical working on the part of the manager.

The task of the directors, says the Diamond Fields Advertiser, was a comparatively pleasant one at the recent meeting of shareholders. For a company to be declared unassailable as to its position must be satisfatory in these times of trouble and difficulty. It was a wise resolve to make public the exact position of the company by publishing its report and financial statements. Neither the North-East nor any other well-managed company will ever lose anything by publicity; it is only the crookedly worked companies, who dare not publish their accounts, who have any show of advantage in keeping their affairs secret. Even these companies lose by the suspicion engendered through want of publicity and definite information, and such suspicions generally magnify the evil condition considerably. The pickings during the period of three months, and the realisation, was 11,161*l.* 13s., being at the rate of 2·193 carats, or 2*l.* 11s. 11½d. per load of 16 cubic feet. We doubt if such an average has ever been published by any other company; in fact, this company's ground must be "a pocket of diamonds." When it is remembered how long this company's ground has been covered with reef, and at what short intervals it has been workable for some time past, it is a marvel that the accounts are so favourable. The secret lies in the very exceptionally productive character of the ground. The company has no debt, except its share of the Mining Board liabilities; therefore, no reluctant sheriff need be expected to perform his lucrative work in that direction. No dividend is payable at present, the directors preferring to keep the bird in hand in anticipation of calls for rate account. We heartily wish this company access to its ground, for it is like that land of which it was said that it only required to be tickled by the plough to laugh forth crops of marvellous richness.

At the BARNATO COMPANY, of Kimberley Mine, general meeting the resolution, to dispose of the whole property and liquidate the company, passed at a meeting held on Aug. 18 was rescinded. Dr. Murphy then reported to the meeting that Mr. Barnato and himself were deputed to interview the delegate of the British Company, Mr. Goch. They had many meetings and the negociations lasted five weeks. The delegates of each company at length agreed to a certain provisional agreement, which they lodged with their several attorneys, and upon it an agreement for final ratification would be drawn. It would be for the shareholders to agree to the basis or not. The doctor proceeded to read the agreement which was rather lengthy; by it the capital of the British after taking in the Barnato is to be raised from 103,600*l.* to 153,540*l.* in 15,354 shares of 10*l.* each. The claims, plant, and machinery of the two companies to be amalgamated on the basis of equal proportionate value, the proportion being 4 to 9. With 4000*l.* allowed to the Barnato Company for its high blue ground, and setting off the Mining Board paper held against that held by the British, the Barnato Company, it is estimated, will still be deficient in a balance between the companies to the extent of something like 1000*l.* This deficit, Dr. Murphy said, the agreement proposed should be made a first charge on the dividends that might accrue upon the shares given to the Barnato, with interest. The delegates would advise the meeting to have the deficit, whatever it might be ascertained to be when the books of the company where audited, at once deducted from the amount of the shares to be given to the Barnato, and not to allow it to remain a liability on the shares. Before a balance could be struck the company's books must be audited, and a balance-sheet obtained. They already had the British. The Chairman and Dr. Murphy both said they had been fairly met by the British Company. The provisional arrangements for amalgamation with the British Company having thus been agreed on between the delegates of the two companies and explained, the following resolution was passed:—"That the provisional agreement entered into by Messrs. Barnato and Murphy be confirmed, provided they can make arrangements with the delegates of the British Company that any deficit which the Barnato Company may have be deducted from the shares to be given to the Barnato Company instead of remaining a liability on its shares." The meeting then adjourned until the delegates are prepared to report, when a final ratification will be given to the agreement of amalgamation.

The EUROPEAN MINING COMPANY, of Dutoitspan Mine, report and balance-sheet for the half-year ended Sept. 30 indicate that the condition of the company continues to improve. During the six months, 51,170 loads of blue were hauled and 52,420 loads washed, the stock on the floors at the end of the period being 3514 loads; the yield of diamonds was 9127½ carats, which realised 14,370*l.* 4s. By extreme economy in working the cost of treatment was reduced 4s. 7¾d. per load, so that a margin of profit remained, and a profit of about 4000*l.* was made. Under ordinary circumstances the profit would have been much greater, but through there having been a quantity of reef and debris in the claims which had to be treated with the blue, the average yield per load was considerably reduced. In future working this difficulty will not have to be contended with to the same extent, and the reduction of working expenses and the satisfactory amount of work being done are permanent advantages, and augur well for the payment of a dividend next half-year. Nine claims were purchased at a cost of 4161*l.* 14s., which amount was writ-off profit and loss, and two claims having been abandoned, the number of claims now owned is 39. The machinery and plant have been kept in thorough repair, but 5 per cent. has been written off for depreciation, a course which is now rightly being adopted by most companies; an amount of 787*l.* has also been written off property account for depreciation. These are the leading features disclosed by the report and balance-sheet, and they show the company to be in a sound and progressive condition.

The JAGERSFONTEIN MINE prospects never, according to the Express correspondent, looked brighter than at the present time. Not that the finds are particularly large, or of extra superior quality, but because the blue ground has in several places had a fair trial, and has proved payable. Messrs. Kerr Bros. and the Kohinoor and President lessees have now been working blue for the last nine months, and the results are quite satisfactory. When this can be said of the upper layer, it is tolerably safe to say that the succeeding layers will increase in value, for such has been the case in all the mines hitherto worked. It is quite possible that portions of the ground will not prove remunerative—there are poor layers even in Kimberley Mine—and it will be when these portions are worked that the want of capital will be keenly felt; it is to be feared that in some instances the workers will not be able to bear the strain on the exchequer until richer ground is reached, so that stoppage will sometimes ensue, but eventually some other persons will follow up the enterprise and reap the reward. There are but few items of special interest to record this week. Messrs. Gemmell and Nyfe ceased work yesterday in the Meteor claim, and Mr. Herzska starts almost immediately. Tarry and Co.'s new gear is ready for work, with the exception of the hauling-engine, which is coming from Kimberley. Mr. R. F. Jones, who is directing the work, has sunk for and obtained water on the floors appertaining to Harrington's claims, and will be enabled to wash about 1000 loads a day of yellow ground. The success of this enterprise is almost a certainty, though the present outlay in gear and machinery must have been over 7000*l.* Messrs. Kerr Brothers are erecting their second washing machine, which though having only one elevator will work two rotaries, thereby enabling them to put through altogether quite 2000 loads per diem. Mr. David Kerr is at present gone on a trip to Kimberley. There is some talk of the Central Company starting work again. Mr. Rowe, the manager, has the option of carrying out certain plans of working the blue ground by shaft and tunnel. Mr. Sam Dodd will recommence work in the Jagersfontein Company's block in a short time, and Messrs. Smith and Fulton are expected from England intending to open out Frames' old workings. Messrs. McCrea and Townsend are hauling reef with Miller's horse-whim; the work is tedious, but they are old hands not easily daunted, though they probably have 30,000 loads before them. May they meet with the success they deserve. Mr. Miller is pegging away at the Star ground, but is reticent as to finds. Kaffir labour is scarce, many boys having left, no doubt through quarantine regulations and restrictions, which they regard as needlessly vexatious.

ELECTRIC LIGHTING FOR STEAMSHIPS.

The Institution of Civil Engineers held their first meeting of the new session on Tuesday evening (Sir J. W. Bazalgette, C.B., the President, in the chair), when an interesting paper by Mr. ANDREW JAMIESON, A.M.I.C.E., F.R.S.E., was read. The author remarked that although it was not more than three years since the first application of incandescence electric lighting to the general illumination of steamships, the advantages accruing therefrom had been so universally recognised, that more than 150 ships had been fitted with it, and scarcely a man-of-war or a first-class passenger steamer now left the builder's hands without having it on board. The rapid success was mainly due to the following causes:—1. Electric lighting on the incandescence system, when properly fitted, was more healthful, cooler, more easily handled, and more artistic than other systems of lighting; there was no smell, and no products of combustion to tarnish giltwork; it was more agreeable in every way than any of the older methods of illumination.—2. The danger from fire was less, as neither matches nor lighted tapers were required.—3. The daily cleaning and replenishing of lamps, as well as the keeping in store of highly inflammable oil, paraffin, or candles, could to a greater extent be dispensed with.—4. The expense of maintenance was not much in excess of that of the older methods of illumination (in some cases less), whilst the space occupied by the plant was not great, and its position near to, or in, the engine-room caused no annoyance to passengers.

As the dynamo which furnished the electricity for feeding the incandescence lamps had to be driven at a uniform velocity, neither the ship's main engines, nor the donkey, nor winch engines, were suitable for the purpose. The dynamo must have an engine for itself. It was, in most cases, necessary to place this special engine and the dynamo in such a position that the men on watch at the main engines could, with a minimum of trouble, also attend to the electric plant. The position, therefore, was naturally somewhere near the starting platform, and, if possible, on the ship's floors, so that undue vibration and noise might be avoided. Frequently a convenient recess could be provided, either immediately behind the main starting platform, or opposite to the thrust-block just outside the screw-shaft tunnel door. Only in large installations would it pay to have on board an electrician solely to attend to the dynamo, its engine, and lamps. In such cases a convenient and cool position was generally selected between decks, in the same compartment with, or in that next to, the refrigerating machinery, if such should be on board, so that one man might attend to both of these novel appliances. Where practicable the axes of dynamos with large heavy armatures should be placed fore and aft to obviate as much as possible the effect of gyrostatic action, since the angular velocity due to rolling was greatest atwartship. The author here gave Sir William Thomson's formula and examples, to show the pressure produced on the dynamo bearings, under different circumstances, by gyrostatic action.

In selecting a dynamo it was necessary to determine whether or not it fulfilled certain requirements:—1. It must develope electromotive force suitable for a certain lamp when driven at a certain definite speed.—2. It must be self-regulating; that was the electromotive force generated at the given speed must remain constant to within 5 per cent., whether working one lamp or more, or the full number of lamps. It was preferable to have a slight fall in electromotive force as the number of lamps was reduced.—3. There must be no undue emission of sparks at the commutator-brushes.—4. When running light, or with less than the full number of lamps there must be no undue heating of any of the parts.—5. The conductivity of the copper wire with which it was wound must not be less than 96 per cent. of pure copper.—6. The insulation-resistance of the armature and electro-magnets should not be less than 10,000 ohms per volt generated at the required speed. The dynamo should be tested mechanically and electrically before being put on board ship, and afterwards, when fixed in position, by a final trial of not less than six hours' duration, with its own engine, and with all the lamps in circuit. There was considerable diversity of opinion regarding the limit of speed of a dynamo on board ship. As a consequence of the general desire for low speeds, most of the best forms of dynamos, the Siemens, the Edison, the Edison-Hopkinson, the Victoria, the Ferranti-Thomson, and the Pilsen-Schuckert, had been specially modified for ship use, so as to produce the required electromotive force and current, at speeds varying from 400 to 650 revolutions per minute.

The success or failure of an installation on board ship depended as much upon the engine as upon the dynamo, and every care should be taken to procure one that needed the minimum of attention, and was not likely to break down. The engine should be capable of driving the dynamo during a voyage to Australia and back, without a hitch and without requiring overhauling. The demand for such engines, more especially for those driving direct, had led to the production of a great variety, many of them excellent in workmanship and in detail. It was frequently necessary that the engine should be capable of doing its work when supplied with steam, either from the main or from the donkey boilers, so that the electric light might be available in port as well as at sea. This entailed capability for working under variable pressures, and thus the size of the engine must be adapted for the lower pressure. One of the most important adjuncts to the engine was its governor. It should be sufficiently sensitive and reliable in action to keep the engine within 5 per cent. of its normal speed, with a lode varying 90 per cent., and a boiler pressure varying 10 lbs. per square inch. No mechanical governor could do this, and consequently a good electrical governor, which would automatically open and close the throttle-valve, in perfect synchronism with the load or work to be done, and leave the valve in its last position until a change was made either in the load or in the steam pressure, was greatly to be desired. The author showed how this problem had been solved by means of his electrical governor.

Then were detailed the different methods of driving dynamos on board ship by belts, ropes, gearing, direct-driving fast speed engines, such as Brotherhood's, the Westinghouse, Siemens' Frictional Drive, &c. The author explained the methods of fitting leading wires into vessels, instancing certain well-known cases by plans of the s.s. Adelaide and the s.s. Arawa, and gave a practical rule which he had been in the habit of using for the dimensions of such wires. Insulation resistance was too often neglected by electric light engineers. Amongst submarine telegraph engineers it was considered of vital importance to watch the insulation resistance with the most rigid accuracy, not only during the manufacture of a cable, but during its submersion and after it had been laid; whereas, in the case of electric lighting, those charged with the fitting up of an installation very seldom thought of, or even knew how to take, insulation tests, either of the dynamo or of the leading wires. It was far from right to allow leads to be run up like bell-wires, without the slightest knowledge as to whether a flaw or a fault had crept in, and all engineers should insist upon rigid inspection, as well as thorough and searching tests, before an installation was passed. The insulation resistance standard need not be nearly so high as in the case of submarine cables, but nevertheless it did require to be several hundred times more than the copper resistance, otherwise a fault would soon develope and short circuiting occur, under the combined influences of the electromotive force and damp or wet. The dielectric should therefore, in addition to being a good insulator, be thoroughly water-tight, and as little liable as possible to be affected by atmospheric changes. The author then gave a description of what he had found to be the best form of switches, fusible plugs, lamp-holders, lanterns, and globes. Finally, he directed attention to the powerful search-lights used on board men-of-war, and to the novel application of arc lighting for salvage and fishing purposes.

EDISON AND SWAN UNITED ELECTRIC LIGHT COMPANY.—A meeting was held at the Cannon-street Hotel, on Tuesday, when Mr. J. S. Forbes presided. The Chairman said the desire of the directors in calling the present meeting was to find out what the majority of the proprietors wished to have done, and, if the constitution of the company would enable the directors to do it, he presumed that it would be done. The serious loss attending the past working had now disappeared, and for the first three months of the current year's operations there had been a balance of profit of 752*l.*, or at the rate of 3000*l.* a year. Their patents were being infringed, but it was their intention to take proceedings to establish their rights, and the fact that the Edison and the Swan Companies had been amalgamated would enable them to act far more effectively in that direction than if the union had not taken place. It was their intention to do no more speculative business, either street, house-to-house, or any other lighting; but only that which paid. He had no resolution to submit, because, as he had said that was not a legal meeting.—Viscount Anson (a director of the Edison Company, and of the united company), afterwards addressed the meeting, and said he thoroughly agreed with all the Chairman had said. He believed it would be a great mistake if they now decided to stop the company altogether, for if they could only hold their own for a short time, he believed there was a possible and a probable chance of their doing very well.—Mr. Kempster thought there was only one way of finding out the wishes and views of the shareholders, and that was by proposing a resolution. He accordingly moved a resolution appointing seven shareholders to enquire into the past working of the two companies before their amalgamation, the present position of the united company, and its prospects of successful working, &c. The motion having been seconded, Sir John Lubbock, M.P. (the Chairman of the Edison Company), and other shareholders spoke against it, and eventually it was withdrawn. The Chairman said if it had been pressed the directors would have opposed it. The certificates of the shares would be issued as soon as practicable.

MYSORE GOLD MINES.—At length (writes a correspondent) the truth of what Mr. Bell-Davies and Mr. Brough Smyth said as to the Indian gold mines is about to be verified. The Mysore Gold seems to be the only one on the block (the Mattamungalum) in which anything like practical mining has been prosecuted with vigour, and the shareholders are now about to derive the benefit of this course, inasmuch as the last crushing is said to have yielded from 3½ to 4½ ozs. of gold to the ton of quartz crushed. This to many must be a pleasant awakening from the state of hopeless despair into which, with the exception of this mine, the Indian mines had been allowed to fall; and why? Simply because no vigorous prosecution of mining in depth has ever been pursued. Rumour has it, and it is believed that the rumour is reliable, that steps are now being taken to rework in a vigorous and practicable manner the Nundydroog, Ooregum, Mysore Reefs, and several other mines on the same block.

FIERY COAL MINES.—Mr. R. Punshon, of Farringdon-street, has invented an explosive for use in fiery mines which he declares gives off no fire or flame when used, whence it would be obvious that all danger is overcome of firing coal mines when shots are fired.

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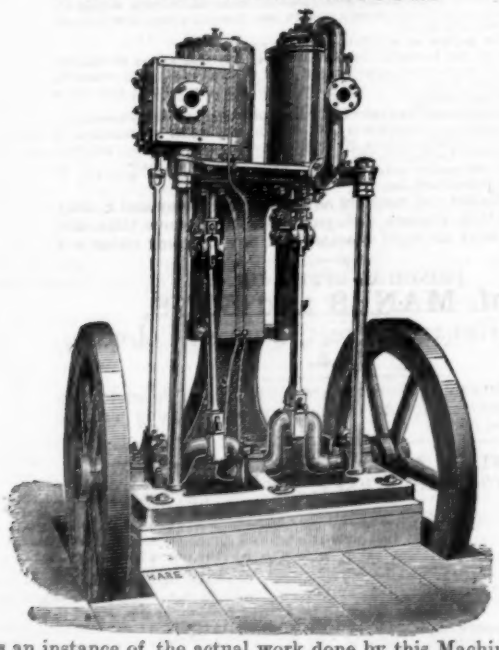

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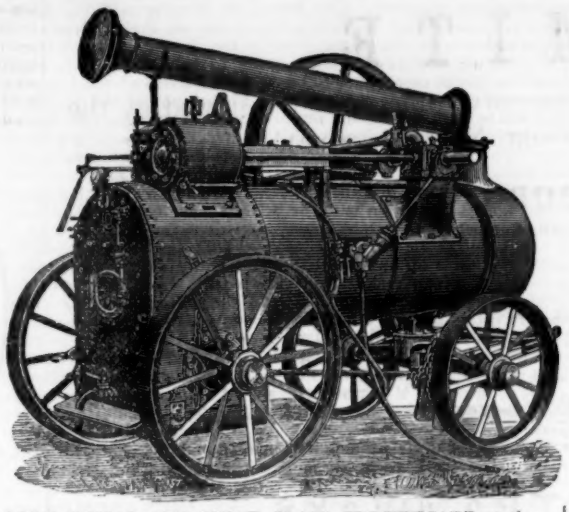

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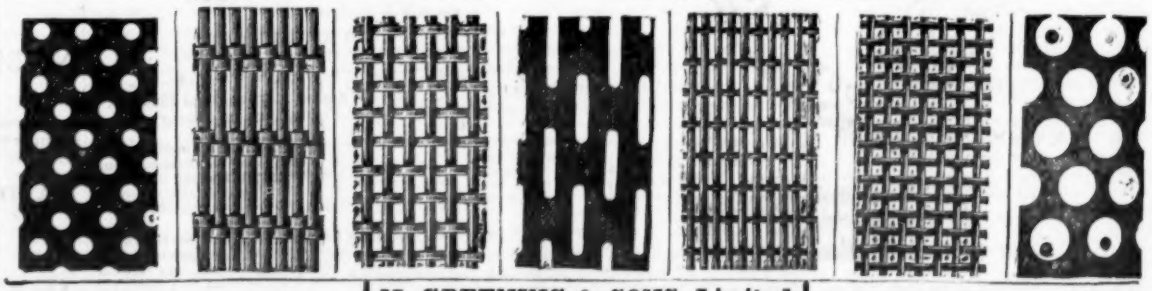

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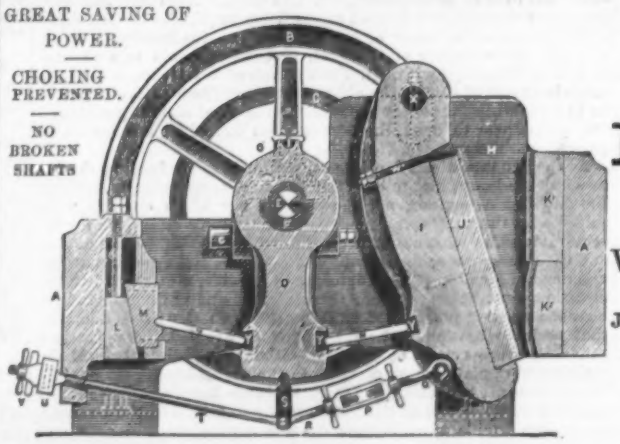

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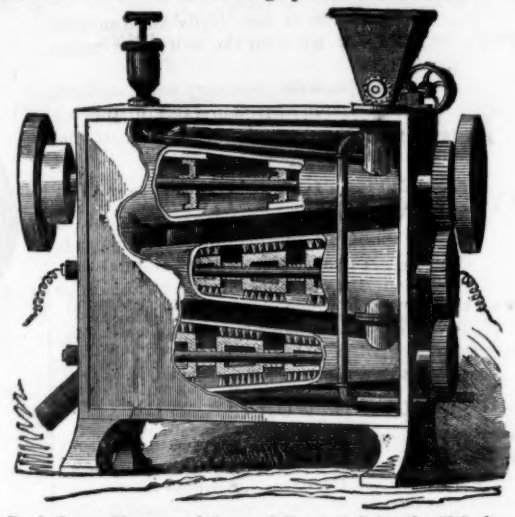
The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.

2.—The loss being less than 10 per cent.

3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

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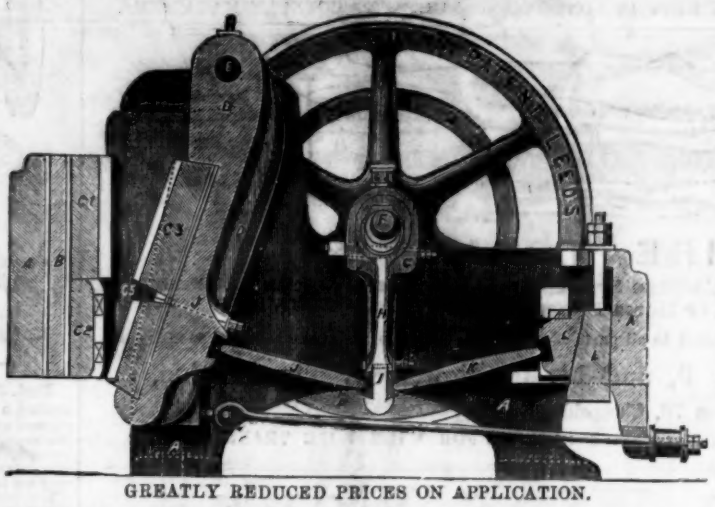

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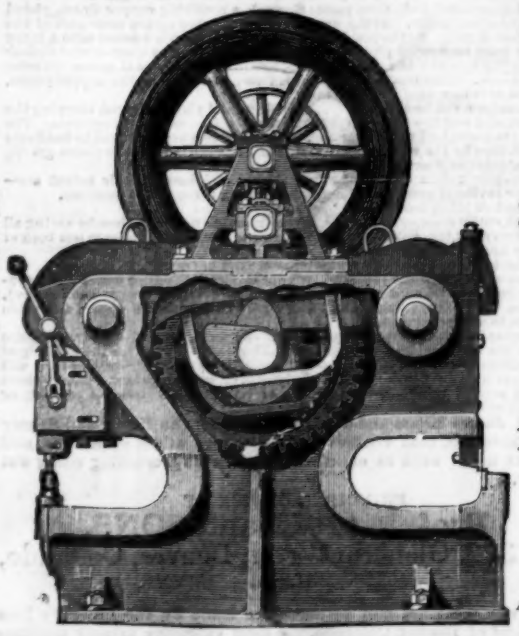

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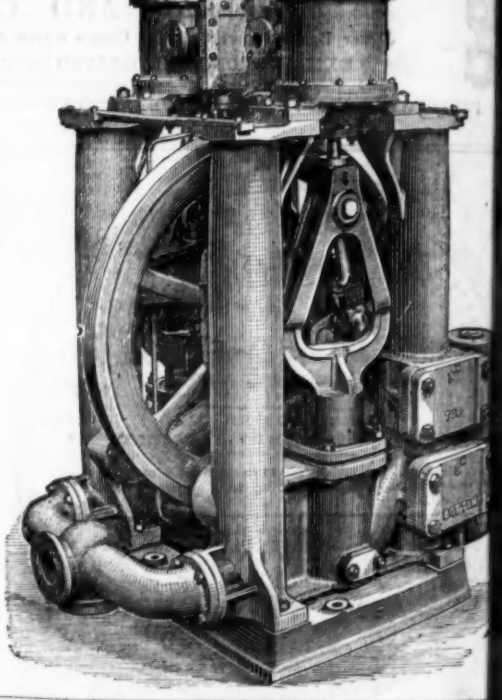

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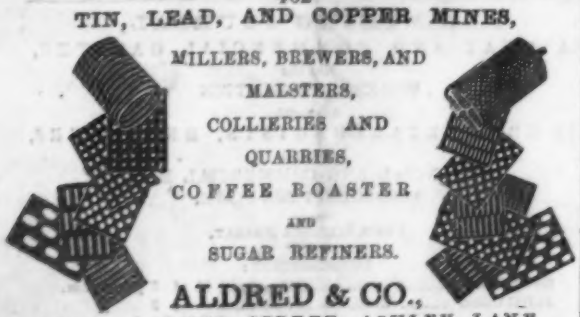

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